This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

**Usage guidelines**

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

**About Google Book Search**

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

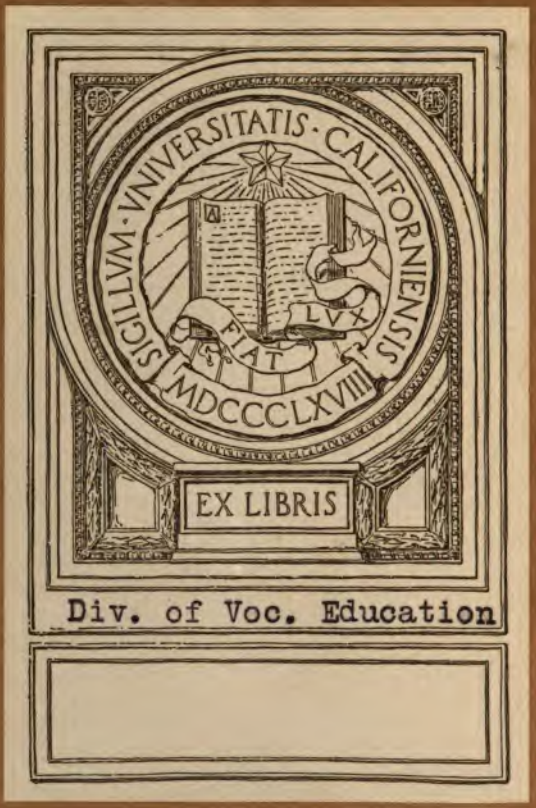
# VOCATIONAL AGRICULTURAL EDUCATION

## BY HOME PROJECTS

STIMSON

EARNING AND LEARNING

VC 1050


SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS
LVX
FIAT
MDCCCLXVIII
EX LIBRIS
Div. of Voc. Education

$2.50

F. L. Griffin

# VOCATIONAL AGRICULTURAL EDUCATION

THE MACMILLAN COMPANY
NEW YORK · BOSTON · CHICAGO · DALLAS
ATLANTA · SAN FRANCISCO

MACMILLAN & CO., LIMITED
LONDON · BOMBAY · CALCUTTA
MELBOURNE

THE MACMILLAN CO. OF CANADA, LTD.
TORONTO

*Frontispiece.* — Four Fundamental Factors of the Home-project Plan: agricultural instructor, at left; home farm, such as one on which this group stands; the pupil, who lives at home and whose training is as much at home as it is at school; and state supervisor, standing by his car at right, who judges the efficiency of the instructor primarily by the quality of the pupil's project work, project study, and project records and accounts. This pupil is Harry Norcross of Brimfield, Mass., examples of whose accounts and reports appear on pages 410, 412, 414-415, and 428-430.

# VOCATIONAL AGRICULTURAL EDUCATION

## BY HOME PROJECTS

BY

RUFUS W. STIMSON

STATE SUPERVISOR OF VOCATIONAL AGRICULTURAL EDUCATION IN MASSACHUSETTS

*"The better part of courage is the courage of having done the thing before"* — EMERSON

New York

THE MACMILLAN COMPANY

1919

*All rights reserved*

UNIVERSITY OF CALIFORNIA

LB1681
S7
Vocat. educ.

Gift of Agric. Educ.
to Voc. Educ.

COPYRIGHT, 1919.
BY THE MACMILLAN COMPANY.

Set up and electrotyped. Published May, 1919.

Norwood Press
J. S. Cushing Co. — Berwick & Smith Co.
Norwood, Mass., U.S.A.

TO

H. M. S.

672579

# PREFACE

THE Act of Congress known as the "Smith-Hughes Act" requires at least six months a year of "supervised practice in agriculture," either on a farm provided for by a school or on some other farm. This minimum requirement must be met by all who desire federal aid for vocational agricultural education.

The home-project plan, reviewed in the following pages, meets this requirement. Plant projects, from the preparation of the land to the storage or the disposal of the products, have a natural life of fully six months. Animal projects are better for supervision, nine, ten, or eleven months a year.

Typewritten and multigraphed memoranda, also special reports and bulletins of the Board of Education, have set forth certain features of the home-project plan, from time to time, for the information of the Legislature and of those teaching agriculture in Massachusetts. They have not been prepared in such quantities, nor published in such editions, as to permit of general distribution.

Special addresses and papers by the author, on one or another phase of the plan, have appeared in various publications, such as the "Proceedings of the Harvard Teachers' Association," "Transactions of the Massachusetts Horticultural Society," "Report of the Canadian Seed Growers Association," the *Quarterly of Alpha Zeta*, *Business America*, the *New England Homestead*, the *Congregationalist and the Christian World*, the *School Review*, the "Yearbook of the National Society for the Study of Education," and *American Education*. A hundred-page description of the plan was published in 1914, as Bulletin No. 579, by the United States Bureau of Education.

Calls for information from without the state, — greatly multiplied since the passage of the Smith-Hughes Act, — and lack of available printed matter, have prompted the preparation of this book. Its chapters are chapters of experience. The author has undertaken at

all points to support precept by example. Materials have been assembled, revised, and supplemented. Up-to-the-minute information, therefore, is herewith presented.

This book is published, primarily, as a contribution to the study of efficient vocational education; but it has paragraphs of importance to the economist and the sociologist. It has been asked for as a text, or reference book, for use in agricultural teacher-training; and as a guide-book to beginners in vocational agricultural teaching. High school principals, and teachers of science and mathematics, civics, and English, may find in it support for efforts to make their high schools interlock with life, — to teach, at least in part, in terms of their immediate school environments.

For the convenience of the reader, the table of contents is given in two parts. On the first page, the scope of the book may be seen at a glance. On the next pages there is a more detailed analysis.

Many of the half-tones are from the negatives from which the colored slides and transparencies were made for the Massachusetts vocational education exhibit that was awarded the *Grand Prix* at the Panama-Pacific Exposition. But there has been no resting on ancient laurels. The illustrations include the best features of the moment.

Photographs and negatives furnished by the agricultural instructors, directors, and others are elsewhere acknowledged.

The illustrations, as a rule, are arranged so as to picture the home-project plan in a progressive order. But they are kept in touch with the text by frequent cross-references.

Perfection is far from having been reached.

The degree of success so far attained in Massachusetts is due to the capable coöperation of local directors and superintendents of schools; to the resourceful initiative and untiring efforts of the agricultural instructors; to the assistance of federal and state departments of agriculture and forestry, and of the United States Bureau of Education; to the agricultural colleges and experiment stations of this and other states which have been most liberal in furnishing bulletins and circulars of agricultural information; to the local press which has given generous space to notices and results; to the Massachusetts Agricultural College, which, in its Extension Service, instead of employing a

multitude of little men, has employed a moderate number of relatively big men, specialists capable of meeting emergency calls from local instructors for expert help, and which has been host at valuable conferences; and to the wise counsel and unfailing support of the commissioners and deputy commissioners of education, under whose administrations the plan has been developed. Grateful acknowledgment is here made to all who have given of their time and talent.

Throughout the book, the author has intended to give due credit to those whose exemplifications of, or whose contributions to, the home-project plan he has described. To the Board of Education for the loan of photographs and the right to reproduce materials from the files of his department, to Professor Hanus for his kind "Introduction," and to the *Outlook* for permission to print Dr. Lyman Abbott's account of his tour among the home-project pupils and instructors in Massachusetts, the author is particularly indebted.

The manuscript of this book was sent to the publishers June 1, 1918. Unavoidable delays in the manufacturing department, due to the war with Germany, have made it possible to include some interesting recent data. Revisions which would have occasioned still further delays have been avoided, such as substitution of 1918 figures, in place of those of 1917, in statistics on enrollment and earnings.

Inasmuch as this is intended to be an authoritative source book for information about the Massachusetts home-project plan, these delays are, perhaps, fortunate; for they permit the author to announce here two new rulings, dating from February, 1919, affecting high school agricultural departments in this state. The Massachusetts Board of Education will hereafter permit the vocational agricultural instructor in a small high school, where there are only three or four teachers, to serve as principal; and to teach chemistry, physics, botany, and biology.

Permission will be premised upon four definite conditions. It will be given, when the pupils desiring the agricultural course are too few to require an agricultural instructor full time. At least one full half-day of school time daily must be reserved for the program described in Fig. 57 on p. 73; but a pupil who desires to prepare for the Agricultural College may be excused from the first, "Agricultural Survey,"

period, in order to take algebra, geometry, or any other subject required for college entrance credit, and his agricultural instruction in school time may be reduced to ninety consecutive minutes daily. All agricultural pupils must carry on supervised farm work as the foundation, or indispensable accompaniment, of this instruction at least six months every year. Pupils who are not preparing for an agricultural college must devote the entire half-day of school time to this vocational agricultural study or work.

The author was prompted to recommend these new rulings by desire to give boys attending the smaller high schools out among the farms as good an opportunity to study agriculture as is now given boys from farms which are near the larger high schools; and by desire to support the efforts of his colleagues, who are responsible for supervision of state-aided high schools, to encourage the employment of principals who are sympathetic towards the best in country life and who are as much interested in preparing pupils for successful farming careers, as they are in preparing pupils for college. By designating another teacher as vice-principal, and by delegating to the vice-principal the ordinary chores of record keeping and the like, the principal will be as free as the agricultural instructor heretofore has been, to conduct agricultural work and study outside the school building and away from the school premises. During the earlier stages of development of this new plan, it was considered best that the vocational instructor should give his entire time and attention to his agricultural teaching. With the plan better developed, it is now hoped to extend instruction to the smaller high schools with only boys enough to require half of the agricultural teacher's time.

Of course, more nearly permanent tenure of office was also an important reason for these new rulings. We have always held that the agricultural instructor may be paid, and ought to be paid, what he is worth, without regard to the salary schedule for the rest of the high school staff. Consequently, the agricultural instructor's salary has not only equaled the salaries of other teachers, but has even exceeded, in some cases, that of the principal. This has occasioned unrest, sometimes even ill-will. That the agricultural instructor's salary generally covers, not only services in the classroom, but also services

awheel which tax his purse two to four hundred dollars a year, has not relieved such situations. As principal and agricultural instructor, a good man may now be paid what he is worth, and may be held more permanently in a locality which he fits.

Since the agricultural instructor will in no way be hampered by his principalship, but may be immeasurably helped by the general attitude of the high school as a whole toward the work of his vocational department, and since his chemistry, physics, botany, and biology will be correlated with the environment of the school and, therefore, will be primarily agricultural, these new rulings are, of course, entirely in keeping with the spirit and with the methods of the home-project plan set forth in this book. They are, also, in keeping with similar rulings in other states.

The delays in printing, moreover, make it possible to refer here to an important recent discussion of the place of the project in education, namely, the article on "The Project in Science Teaching," by Dr. John Alford Stevenson, of the University of Illinois, College of Education, in the January, 1919, number of *School Science and Mathematics*. He defines a project as "A problematic act carried to completion in its natural setting." His discussion is closely reasoned and clearly illustrated. Dr. Stevenson finds that there is need for the *project* in education, both as a concept and as a term. He is sensible of possible shortcomings in a project method ineffectively applied, but states in his final paragraph the following conclusion: "The *project method* rightly carried on develops great interest, gives training in carrying acts to completion, and provides adequate opportunity for directing thinking and reasoning."

Professor Hanus has visited pupils and projects. His words, like those of Dr. Abbott, are the words of an eye-witness.

Upon the first decade of development of the home-project plan, the author feels that the chapter by Dr. Abbott is a sort of benediction.

RUFUS W. STIMSON.

FEBRUARY 20, 1919.

# CONTENTS

PAGE

INTRODUCTION BY PAUL H. HANUS . . . . . xxxvii

CHAPTER I

VOCATIONAL AGRICULTURAL EDUCATION . . . . . 1

CHAPTER II

HOME-PROJECT SCHOOL OR DEPARTMENT *versus* SELF-CONTAINED SCHOOL . . . . . 32

CHAPTER III

PROJECT STUDY *versus* SUBJECT STUDY . . . . . 59

CHAPTER IV

VEGETABLE GROWING PROJECT STUDY. ILLUSTRATIVE OUTLINES . 99

CHAPTER V

EXAMPLE OF A STATE AGRICULTURAL PROJECT STUDY BIBLIOGRAPHY 135

CHAPTER VI

COUNTY SCHOOLS AND HIGH SCHOOL DEPARTMENTS IN MASSACHUSETTS NO-DORMITORY SYSTEM COMPARED AS TO REQUIREMENTS AND ADVANTAGES . . . . . 178

CHAPTER VII

SUGGESTIONS TO SUPERVISORS, SUPERINTENDENTS, AND DIRECTORS 302

CHAPTER VIII

SUGGESTIONS TO VOCATIONAL AGRICULTURAL INSTRUCTORS . . 399

CHAPTER IX

THE NEW EDUCATION — MAKING FARMERS, BY LYMAN ABBOTT 451

[*For detailed outlines of chapters, see the following pages.*]

# CONTENTS

*MORE DETAILED*

## CHAPTER I

### VOCATIONAL AGRICULTURAL EDUCATION


PAGE

1. EDUCATION . . . . . 1
   (1) Modern *versus* Medieval . . . . . 1
   (2) "What Knowledge Is of Most Worth?" . . . . . 3
   (3) "Liberal and Practical" . . . . . 4
   (4) Practical and Liberal . . . . . 5
   (5) Not a Matter of Moment . . . . . 5

2. VOCATIONAL EDUCATION . . . . . 6
   (1) For Those Over Fourteen . . . . . 6
   (2) Of Less Than College Grade . . . . . 6
   (3) Vocational *versus* Cultural . . . . . 7
      *A*. Limited Appeal of Cultural Education . . . . . 8
      *B*. Schools of Privilege . . . . . 9
      *C*. Schools of Protest . . . . . 9
      *D*. An Army out of School . . . . . 10
      *E*. A Problem of Conservation . . . . . 10
      *F*. Individual *versus* Mass . . . . . 14
   (4) Education by Action and Affairs . . . . . 16

3. VOCATIONAL AGRICULTURAL EDUCATION . . . . . 19
   (1) Definition and Development . . . . . 19
      *A*. Agricultural Schools at Colleges of Agriculture . . . . . 21
      *B*. Separate Agricultural Schools . . . . . 22
      *C*. Agricultural Departments in High Schools . . . . . 24
   (2) A Square Deal in Vocational Education . . . . . 29
      *A*. General Schooling Not Enough . . . . . 29
      *B*. Books and Bulletins Not Enough . . . . . 29
      *C*. The Farm Not Enough . . . . . 30
      *D*. Conclusion . . . . . 31


## CHAPTER II

### HOME-PROJECT SCHOOL OR DEPARTMENT *VERSUS* SELF-CONTAINED SCHOOL


1. SPECTATOR *versus* PARTICIPANT . . . . . 32

2. THE FUNDAMENTAL PROBLEM . . . . . 35

PAGE

3. PRODUCTIVE FARMING AS EDUCATIONAL PROJECTS . . . . . 38
(1) First Use of Term "Project" for Unit of Vocational Instruction . . . 39
(2) "Project" Defined and Described . . . . . 40
*A.* A Farming Project, A Thing to be Done . . . . . 40
*B.* A Farming Project, Something to be Done on a Farm . . . . 41
*C.* A Farming Project Involves an Educational Process . . . . 42
*D.* Three Elements of a Project . . . . . 43
*E.* Project Fields or Classes . . . . . 44
(3) Educational Analysis of a Project . . . . . 44
*A.* Abundant Crop . . . . . 45
*B.* Clean Crop . . . . . 48
*C.* Sound Crop . . . . . 49
*D.* Sub-projects . . . . . 49

4. PROJECTS OF PUPILS AND OTHER FARM WORK . . . . . 50

5. PARENTS LIKE HOME PROJECTS . . . . . 53

6. YOUNG PEOPLE RESPOND . . . . . 54

7. COUNTING THE COST OF FARMING . . . . . 55

8. EARNING AND LEARNING . . . . . 56

9. CONCLUSION . . . . . 57

## CHAPTER III

### PROJECT STUDY *VERSUS* SUBJECT STUDY

1. PROJECT WORK AND PROJECT STUDY . . . . . 59

2. PROJECT STUDY SUITABLE FOR VOCATIONAL AGRICULTURAL SCHOOLS . . . 59
(1) Range and Progress . . . . . 59
(2) Studies Not on Diagram . . . . . 60

3. PROJECT STUDY SUITABLE FOR VOCATIONAL AGRICULTURAL DEPARTMENTS IN SELECTED HIGH SCHOOLS . . . . . 60
(1) Necessary Groupings . . . . . 60
(2) Agriculture First . . . . . 62

4. PROJECT STUDY CONCENTRATION. YEAR LIMITS . . . . . 62
(1) Pupil . . . . . 62
(2) Instructor . . . . . 63
(3) Published Year Groups . . . . . 63

5. PROJECT STUDY AND CAPACITY OF PUPILS . . . . . 63
(1) Individual *versus* Class . . . . . 63
(2) Varying Capacity . . . . . 64

6. KINDS OF PROJECT KNOWLEDGE . . . . . 64
(1) Rules . . . . . 64
(2) Reasoning . . . . . 65

PAGE

(3) Broader Results . . . . . 65
(4) Typical for All Projects . . . . . 66
(5) The Three R's of the Project Method . . . . . 66

7. Project Study Program and Records . . . . . 68
(1) Of Highest Importance . . . . . 68
(2) A Supposed Project . . . . . 68

8. Apportionment of Project Study Time and Materials . . . . 69
(1) Diagram Column Widths . . . . . 69
(2) Faculty Coöperation . . . . . 70
(3) No Pupil "Held Back" . . . . . 71
(4) First Column, First in Fact . . . . . 71
(5) High School Half-days, Spring and Fall . . . . . 71
(6) More Mature and Less Mature Minded . . . . . 71
(7) Project Study *versus* Agricultural Survey . . . . . 72
(8) Class Focus . . . . . 72
(9) Individual Focus . . . . . 72
(10) Prime Merit of this Apportionment . . . . . 74

9. Vegetable Growing Project Study . . . . . 76

10. Small Fruit Growing Project Study . . . . . 78

11. Beekeeping Project Study . . . . . 79

12. Poultry Keeping Project Study . . . . . 80

13. Sheep and Goat Husbandry Project Study . . . . . 82

14. Swine Husbandry Project Study . . . . . 82

15. Ornamental Planting Project Study . . . . . 83

16. Third-year and Fourth-year Project Study — Orcharding, Market Gardening, Dairying, Farm Management . . . . . 83

17. Project Study Perspective . . . . . 84
(1) "Improvement" and "Trial" Projects Desirable . . . . . 85
(2) "Productive" Projects Fundamental . . . . . 86

18. Project Study *versus* Subject Study . . . . . 88
(1) Subject Study . . . . . 88
*A*. Organized Knowledge . . . . . 88
*B*. Deferred Values . . . . . 89
*C*. Agriculture and Subject Study . . . . . 89
*D*. The Unaided Farm Boy . . . . . 90
*E*. Education in Forgetting . . . . . 90
*F*. Subject-study Merits . . . . . 92
(2) Project Study . . . . . 92
*A*. Accompanied by Subject Study . . . . . 92
*B*. Organization of Common Sense . . . . . 93

## CHAPTER IV

### ILLUSTRATIVE PROJECT STUDY OUTLINES APPLIED TO VEGETABLE GROWING

PAGE

1. Project Study Outline Making in Massachusetts . . . . . 99

2. Vegetable Growing Project Study Outlines . . . . . 102
   (1) Project Study and Vegetable Groups . . . . . 102
      *A.* Possible Classifications . . . . . 102
      *B.* Possible Varieties . . . . . 104
      *C.* Classification by Methods of Cultivation . . . . . 105
      *D.* Varieties of Vegetables per Pupil . . . . . 106
   (2) Project Study by Vegetable Groups . . . . . 109
      *A.* A Practical Approach . . . . . 109
      *B.* Aid to Garden Planning . . . . . 109
      *C.* Good but Inadequate . . . . . 113
   (3) Project Study by Vegetable Varieties . . . . . 114
   (4) Suggestive Project Study Outline — Kitchen Gardening . . . . 119
   (5) Suggestive Project Study Outline — Lettuce Growing . . . . 126

## CHAPTER V

### EXAMPLE OF A STATE AGRICULTURAL PROJECT STUDY BIBLIOGRAPHY

1. Approved Agricultural Papers and Periodicals . . . . . 137
   (1) *New England Homestead* . . . . . 138
   (2) *Rural New Yorker* . . . . . 138
   (3) *Breeder's Gazette* . . . . . 138
   (4) *Hoard's Dairyman* . . . . . 138
   (5) *Market Growers' Journal* . . . . . 138
   (6) *Garden Magazine* . . . . . 138
   (7) *Gleanings in Bee Culture* . . . . . 138
   (8) *Wareham Courier* . . . . . 138
   (9) *Better Fruit* . . . . . 138
   (10) *Park and Cemetery, and Landscape Gardening* . . . . . 138

2. Free Bulletins, Circulars, and Reports . . . . . 140
   (1) The Federal Board for Vocational Education . . . . . 140
   (2) The United States Bureau of Education . . . . . 140
   (3) The United States Department of Agriculture . . . . . 140
      *A.* Farmers' Bulletins . . . . . 141
      *B.* Department Bulletins . . . . . 141
      *C.* Journal of Agricultural Research . . . . . 141
      *D.* Other Publications . . . . . 141
   (4) The Agricultural Experiment Stations . . . . . 143
   (5) The Extension Service of the Massachusetts Agricultural College . . 147

PAGE

(6) The Massachusetts Board of Agriculture . . . . . 151
(7) The State Forester . . . . . 151

3. TEXT, EXERCISE AND REFERENCE BOOKS, BULLETINS, CIRCULARS, AND REPORTS 153
(1) Instructor's Aid Necessary . . . . . 153
(2) Lists Subject to Revision . . . . . 154
(3) Prices and Estimates . . . . . 154
(4) Student Purchases . . . . . 155
(5) Reference Numbers for Books . . . . . 155
*A*. Library Arrangement . . . . . 155
*B*. Project Outlines . . . . . 156
*C*. Library Card Indexes . . . . . 156
*D*. Future Entries . . . . . 157
(6) Reference Numbers for Publishers . . . . . 157
(7) State Help and Approval . . . . . 157

4. AGRICULTURAL PROJECT STUDY BIBLIOGRAPHY ARRANGED FOR READY REFERENCE 158
(1) Textbooks Approved for First and Second Year Agricultural Survey . . 158
(2) Textbooks Approved for Third and Fourth Year Agricultural Survey . . 158
(3) For First and Second Year Study of Projects in:
*A*. Vegetable Growing . . . . . 159
*B*. Small Fruit Growing . . . . . 159
*C*. Beekeeping . . . . . 160
*D*. Poultry Keeping . . . . . 160
*E*. Sheep Husbandry . . . . . 161
*F*. Swine Husbandry . . . . . 161
*G*. Ornamental Planting . . . . . 161
(4) For Third and Fourth Year Study of Projects in:
*A*. Animal Husbandry . . . . . 162
*B*. Fruit Growing . . . . . 163
*C*. Market Gardening . . . . . 163
(5) For Laboratory Exercises and Scientific Data Bearing upon the Productive Projects Undertaken . . . . . 164
*A*. Agriculture in General . . . . . 164
*B*. Animal Diseases . . . . . 165
*C*. Animal Foods and Feeding . . . . . 165
*D*. Animal Life, Propagation and Tests . . . . . 165
*E*. Bacteriology, Agricultural . . . . . 166
*F*. Birds and Agriculture . . . . . 166
*G*. Botany and Plant Physiology . . . . . 166
*H*. Chemistry and Agriculture . . . . . 167
*I*. Construction and Repairs: Plans, Materials, Tests, etc. . . . 167
*J*. Dairy Products, Manufactures, Chemistry, and Bacteriology . . 168
*K*. Farm Management and Rural Economics . . . . . 168
*L*. Fruits . . . . . 169
*M*. Insects . . . . . 169
*N*. Lime and Liming . . . . . 169
*O*. Physics of Agriculture . . . . . 170

PAGE

*P.* Plant Diseases . . . . . 170
*Q.* Plant Foods and Feeding . . . . . 170
*R.* Plant Life, Propagation and Tests . . . . . 171
*S.* Soils, Geology, Physical Geography, Soil Fertility . . . . . 171
*T.* Spraying and Fumigation . . . . . 172
*U.* Text-books and Manuals for Schools . . . . . 172
*V.* Trees and Shrubs, Not for Fruit . . . . . 173
*W.* Weeds and Their Eradication . . . . . 174
*X.* Zoölogy, General and Economic . . . . . 174
(6) For Betterment of Country Life and Education . . . . . 174

5. Publishers and Their Addresses . . . . . 176

## CHAPTER VI

### COUNTY SCHOOLS AND HIGH SCHOOL DEPARTMENTS IN THE MASSACHUSETTS NO-DORMITORY SYSTEM COMPARED AS TO CERTAIN REQUIREMENTS AND ADVANTAGES

1. Authorization . . . . . 180
(1) Chapter 471 of the Acts of 1911 . . . . . 180
(2) But This Act Is Not Sufficient Authorization . . . . . 180

PAGE

*A.* County School . . 180 | *B.* High School Department 180

2. Control . . . . . 181

(1) County School . . . 181 | (2) High School Department . 181
*A.* Board of Trustees . . 181 | *A.* School Committees . . 181
*B.* Director Is Executive Officer . . . 181 | *B.* Superintendent Is Executive Officer . . 181
*C.* Records . . . . 181 | *C.* Records . . . . 181

3. Organization . . . . . 182
(1) Coöperation with Educators . . . . . 182
(2) Coöperation with Farmers . . . . . 183
(3) The Plan of Organization . . . . . 185

(4) County School . . . 186 | (5) High School Departments . 186
*A.* Director . . . . 186 | *A.* Superintendent of Schools 186
*B.* Staff of Specialists . . 188 | *B.* Agricultural Instructor or Instructors . . 188
*C.* Advisory Committee . 189 | *C.* Advisory Committee . 189

*D.* Branches of County Schools . . . . . 191

*E.* Farm Bureau Department 191 | *F.* Farm Bureau Coöperation 191

*G.* Program: Time Allotment for Day Pupils . . . . . 195
*H.* Size of Classes . . . . . 195
*I.* Persistency of Attendance . . . . . 196

PAGE

*J*. Special Efficiency Corps . . . . . 196
*K*. Staff "Vacation" and "Professional Improvement" Provisions . . 197

4. LOCATION . . . . . 199

PAGE

(1) County School . . . 200
*A*. On a Farm . . . 200
*B*. Accessibility . . . 201
*C*. Acreage and Variety of Soil 201
*D*. One-teacher Branches in High Schools . . 201

(2) High School Department . 200
*A*. In a High School Building 200
*B*. Accessibility . . . 201

5. EQUIPMENT . . . . . 202

(1) County School . . . 202
*A*. The Farm . . . 202
*B*. Classrooms and Their Equipment . . 206
*C*. Examples . . . 208

(2) High School Department . 202
*A*. No Farm . . . 202
*B*. Classroom and Its Equipment . . . 206
*C*. Examples . . . 208

6. COURSES OF STUDY . . . . . 216

(1) County School . . . 219
*A*. Agricultural . . . 219
*B*. Non-agricultural. Required of All-day Pupils 258

(2) High School Department . 219
*A*. Agricultural . . . 219
*B*. Non-agricultural. Optional, But Advised . 258

7. QUALIFICATION OF TEACHERS . . . . . 266
(1) Fitness for Particular Position . . . . . 268
(2) Not Passed upon Once for All . . . . . 269
(3) Qualifications for Improvement . . . . . 269
*A*. For Improvement in Farming . . . . . 269
*B*. For Improvement in Teaching . . . . . 270
(4) Agricultural College Training . . . . . 271
(5) Lifelong Farm Experience . . . . . 271
(6) Certain Differences . . . . . 271

*A*. County School . . 272

*B*. High School Department . 272

8. METHODS OF INSTRUCTION . . . . . 276
(1) Home-project Visitation . . . . . 276
(2) Lantern Slides and Charts . . . . . 277
(3) The Following Differences . . . . . 277

*A*. County School . . . 277
(*A*) Correlation Controlled . 277
(*B*) Group Instruction and Individual . . . 277
(*C*) Scientific and Practical . 278
(*D*) School and Home Farm . . 279

*B*. High School Department . 277
(*A*) Correlation Voluntary and Variable . . . 277
(*B*) Individual Instruction and Group . . . 277
(*C*) Practical and Scientific 278
(*D*) Home Farm and Department . . . . 279

PAGE

9. CONDITIONS OF ADMISSION . . . . . 280
(1) Age Restrictions . . . . . 280
*A*. Fourteenth Birthday . . . . . 280
*B*. Sixteenth Birthday in Some Cases . . . . . 280
*C*. Twenty-fifth Birthday in Some Cases . . . . . 280
(2) Good Character . . . . . 280
(3) Career Motive . . . . . 281
(4) Physique . . . . . 281
(5) Facilities for Home Projects or Acceptable Substitutes . . . . 282
(6) Non-resident Pupils . . . . . 282

10. EMPLOYMENT OF PUPILS . . . . . 283
(1) Approved Employment . . . . . 283
*A*. Agricultural *versus* Non-agricultural Employment . . . . . 283
*B*. Routine *versus* Educational Agricultural Employment . . . . 284
*C*. Work *versus* Recreation . . . . . 285
*D*. Pupils on Farms *versus* Other Farm Workers . . . . . 286
*E*. Employment Adjustments by Schools and Departments . . . 286
*F*. School Records of Employment . . . . . 294
(2) Employment Honors . . . . . 296
*A*. Prizes . . . . . 296
*B*. Certificates . . . . . 297
*C*. Diplomas . . . . . 297
(3) Agricultural Employment Bureau . . . . . 297
(4) Supervision of Employment . . . . . 297
*A*. Local Triplicate Memorandum Blanks . . . . . 299
*B*. State Supervision Blanks . . . . . 299
*C*. Advisory Committee Supervision . . . . . 299
*D*. Deputy Commissioner's Supervision . . . . . 299
*E*. Commissioner's Supervision . . . . . 300
*F*. Board of Education's Supervision . . . . . 300
(5) Blanks, Files, and Photographic Supplies . . . . . 300
(6) Employment Reports . . . . . 300

11. CONCLUSION . . . . . 300

## CHAPTER VII

### SUGGESTIONS TO SUPERVISORS, SUPERINTENDENTS, AND DIRECTORS, SUPPORTED BY EXPERIENCE IN MASSACHUSETTS

1. KNOW THE AGRICULTURAL RESOURCES AND POSSIBILITIES OF THE LOCALITY YOU SERVE . . . . . 302
(1) Incentives to Farming in Massachusetts . . . . . 303
*A*. The Stresses and Uncertainties of Other Callings . . . . . 303
*B*. Family Attractions and Associations . . . . . 303
*C*. Natural Charm of the Country . . . . . 304
*D*. Life Pursuit to be Found in Farming . . . . . 305

PAGE

(2) Farming Prospects Were Good, and Improving . . . . . 306
*A.* Agricultural Census . . . . . 306
*B.* Massachusetts Farmers Said Farming Prospects Were Promising . . 307
*C.* Few Abandoned Farms . . . . . 308
*D.* Improved Tillage . . . . . 309
*E.* Increase of Investments . . . . . 310
*F.* Little Farms Yielded Large Returns . . . . . 311
*G.* Productivity Compares Favorably with That of Big Farming States . 313
(3) Conclusions . . . . . 314
(4) Present Status . . . . . 314

2. Fit Agricultural Instruction to Local Needs . . . . . 315
(1) Needs of Sons of Well-to-do Farmers . . . . . 315
(2) Needs of Sons of Parents without Land or Live-stock . . . . . 317
*A.* Training for Wage-earning . . . . . 317
*B.* Training for Independent Farming . . . . . 317
(3) Needs of Sons of Farmers of Modest Means . . . . . 321
(4) Needs of Those over Sixteen Who Desire Evening or Other Short Courses . 322
(5) Needs of Families for Itinerant Teaching . . . . . 322
*A.* Example of a Survey of Such Needs . . . . . 323
*B.* Referendum Vote by Cities . . . . . 335
*C.* War Conditions *versus* Conditions of Peace . . . . . 335
*D.* The Future . . . . . 336

3. Organize Farming on School Land as Projects . . . . . 338
(1) This Means Departmental Organization and Responsibility . . . 338
(2) This Means, also, Individual Responsibility . . . . . 339
(3) This Means Cost Accounting Every School Project . . . . . 340
(4) This Means a Written Report on Every School Project . . . . 340

4. Assign Half of Each Day at School, in Consecutive Periods, to Each Project Study Group . . . . . 341

5. Provide for "Professional Improvement" Work Every Year for Every Man . . . . . 342
(1) Improvement Is Possible for the Best of Farmers and for the Best of Teachers 342
(2) Farm-shop Work Good Winter Stop-gap . . . . . 343
(3) Short Courses at State Agricultural College Good Winter Stop-gaps . . 343
(4) Project Plan of Teacher-training . . . . . 344
(5) Promotes Permanent Tenure and Increasing Efficiency . . . . 345
(6) Require Annual Reports on "Professional Improvement" . . . . 346

6. Require Teaching by Projects, Not by Subjects . . . . . 353
(1) Require Preliminary Project Surveys and Agreements . . . . . 353
(2) Require Systematic Project Inspection and Supervision Records . . 353
(3) Require Project Study Outline Making or Adaptation . . . . . 355
(4) Require Seasonal Planning of Related Study and Practice . . . . 355

PAGE

7. PROVIDE FOR TEAM WORK . . . . . 357
(1) Coöperate with Educators . . . . . 359
*A*. With the State Agricultural College . . . . . 359
*B*. With Other Agencies for Agricultural Education . . . . . 361
*C*. With County Farm Bureaus . . . . . 362
*D*. Hold "Conferences on Wheels" . . . . . 364
(2) Coöperate with Farmers . . . . . 367
*A*. Broadsides of Criticism . . . . . 367
*B*. A Fair Answer . . . . . 369
*C*. The Long-distance Educator . . . . . 369
*D*. The Middle-distance Educator . . . . . 370
*E*. The Short-distance Educator . . . . . 371
*F*. Give Farmers a Place of Honor and Influence . . . . . 372
*a*. Invite Farmers to Coöperate as Advisers . . . . . 372
*b*. Invite Farmers to Coöperate in Instruction . . . . . 373
*c*. Invite Farmers to Examine Pupils . . . . . 374
*d*. Avoid Dormitories as a Hindrance to Coöperation with Farmers . 375
*e*. Make School Land and Live-stock Help and Not Hinder Coöperation with Farmers . . . . . 376
(3) Model Types of Organization for Team Work . . . . . 378
*A*. Vocational Agricultural Education and Farm Bureau Work United in a County Agricultural School . . . . . 378
*B*. A Service System, without Publicly Owned Land or Live-stock . . 381
(4) Fight for Service, Not for Leadership . . . . . 384

## CHAPTER VIII

### SUGGESTIONS TO VOCATIONAL AGRICULTURAL INSTRUCTORS

1. MAKE EDUCATIONAL SURVEYS . . . . . 399

2. MAKE SURVEYS OF FARMING . . . . . 399

3. REQUIRE PRELIMINARY PROJECT AGREEMENTS . . . . . 400
(1) Suit Project Agreements to Conditions . . . . . 402
*A*. Projects Should Not be Too Small . . . . . 406
*a*. The Big Project Is a Better Test of a Given Method . . . . 406
*b*. The Big Project Yields the Larger Return . . . . . 406
*c*. The Big Project Bulks Larger on the Home Farm . . . . 407
*d*. The Big Project Bulks Larger in the Community . . . . 407
*e*. The Bigger the Project the Better . . . . . 407
(2) Project Work Should be Done in Working Clothes . . . . . 407
(3) Untoward Conditions Should be Accepted as a Challenge . . . . 407
(4) Ample School Credit for Project Work Should be Provided for in the Preliminary Agreements . . . . . 409

4. REQUIRE PRELIMINARY AGREEMENTS COVERING ALL APPROVED SUBSTITUTES FOR PROJECTS . . . . . 409

PAGE

5. Make Project Study Outlines . . . . . 411
(1) Ask Questions . . . . . 411
(2) Cover the Needs of Every Boy . . . . . 411
(3) Include Short Units of Related Study . . . . . 411
(4) Make Outline Overlap Outline . . . . . 413
(5) Make Outline Overlap Textbook . . . . . 413
(6) Refer to Illustrated Matter . . . . . 413
(7) Prepare Outlines Ahead . . . . . 413
(8) Coöperate in Outline Making . . . . . 414
(9) Mark Outlines for Each Pupil . . . . . 416
(10) Disregard the Printed Sequence . . . . . 416
(11) Improve Your Outlines . . . . . 416
(12) Carefully Select Reference Materials . . . . . 416
(13) Keep the School Reference File Intact . . . . . 416
6. Make Outlined Study Lead to Unoutlined . . . . . 417
7. Require Talking . . . . . 418
8. Keep Project Records . . . . . 418
(1) Require Careful Planning and Note-taking . . . . . 419
(2) Require Accurate Accounting . . . . . 420
(3) Make Photographic Records . . . . . 423
(4) Make Farm Practice Records . . . . . 424
(5) Make Supervision and Instruction Records . . . . . 426
(6) Require Reports in Writing . . . . . 427
*A.* For the Project Instructor . . . . . 427
*B.* For Possible Publication . . . . . 430
*C.* For Double Credit . . . . . 432
*D.* For the "Educational Manager" . . . . . 434
*E.* For the State Supervisor . . . . . 439
9. Keep in Touch with Graduates . . . . . 440
10. Help Educate Gentlemen of the Old School and Farmers of the New 446

## CHAPTER IX

### THE NEW EDUCATION — MAKING FARMERS

By Lyman Abbott . . . . . 451

# LIST OF ILLUSTRATIONS

Four Essentials of the Home Project Plan . . . . . *Frontispiece*

## 1. MOTIVES AND GROWTH

| FIGURE | | PAGE |
|---|---|---|
| 1 | Symbol for Earlier Secondary Education | 7 |
| 2 | Symbol for Earlier Vocational Education | 8 |
| 3 | Symbol for Modern High School Education | 9 |
| 4 | Symbol for Modern Vocational Education | 10 |
| 5 | Symbols for Modern High and Vocational Schools | 10 |
| 6 | Young America's Opportunity | 11 |
| 7 | The Money Value of Education | 13 |
| 8 | The Money Value of Education in Farming | 14 |
| 9 | A "Real Job" | 15 |
| 10 | Growth in Numbers of Vocational Pupils | 17 |
| 11 | Variation in Enrollment by Types of Schools | 18 |
| 12 | Percentage of Attendance " " | 20 |
| 13 | Percentage of Withdrawals from " " | 21 |
| 14 | Percentage of Withdrawals Placed in Industry for which They had Received Some Training | 22 |

## 2. PLANT AND EQUIPMENT

| | | |
|---|---|---|
| 15 | Some Schools Have Land and Live-stock | 24 |
| 16 | "Related Study" Demonstration and Recitation Room | 25 |
| 17 | Substantial Laboratory Tables | 26 |
| 18 | Farm Bacteriology Laboratory | 27 |
| 19 | Farm Chemistry Laboratory | 28 |
| 20 | Farm Shop, Wood Working | 29 |
| 21 | Farm Shop, Iron Working | 31 |
| 22 | Mixing and Using Concrete | 33 |
| 23 | Farm Drawing Room | 34 |
| 24 | Girls Provide School Luncheon | 35 |
| 25 | Home-making Department — One of Kitchens | 36 |
| 26 | Model Dining Room — Table Service | 37 |
| 27 | Home Nursing Room | 39 |
| 28 | Dressmaking and Millinery Room | 40 |
| 29 | Assembly Room — Movable Desks | 41 |
| 30 | Assembly Room Exhibit — Cabinet and Candy Sale | 42 |
| 31 | Assembly Room Exhibit — Sale of Plants and Fancy Articles | 43 |
| 32 | Assembly Room Exhibit — Sewing and Dressmaking Exhibit | 45 |
| 33 | Vista, Essex County Agricultural School | 46 |
| 34 | Horse-barn | 47 |
| 35 | Horse-barn Converted into School Building | 48 |
| 36 | New School Building in Process of Construction | 49 |
| 37 | Steel Lockers and Note-filing Cases | 50 |

| FIGURE | | PAGE |
|---|---|---|
| 38 | Testing Soils in Laboratory | 51 |
| 39 | Basement Lunch Room | 52 |
| 40 | "Project Study" Room | 54 |
| 41 | Electric Cars at Door | 55 |
| 42 | Model Consolidated School | 56 |
| 43 | Model Consolidated School with Greenhouse | 57 |
| 44 | Ashfield Room with Agricultural "Atmosphere" | 58 |
| 45 | A Literary Home Project Work Shop at North Easton | 59 |
| 46 | A Two-teacher Agricultural Department | 60 |
| 47 | High School Department — Even Year Agriculture | 61 |
| 48 | High School Department — Odd Year Agriculture | 61 |
| 49 | Project Study Room at Concord | 62 |
| 50 | Books, Bulletins, Filing Cases, Card-index | 63 |
| 51 | Tag Device for Temporary Numbering of Books | 65 |
| 52 | Poultry Appliances | 66 |
| 53 | Non-book Related Study Materials | 67 |
| 54 | Pruning Tools, Sprayers, etc. | 68 |
| 55 | Bulletin Board and Telephone | 69 |
| 56 | Diagram of Project Study Divisions — the Three R's | 70 |
| 57 | Diagram of Agricultural Periods for Younger Group | 73 |
| 58 | Diagram of Agricultural Periods for Older Group | 74 |
| 59 | Diagram of Agricultural Half Day | 75 |
| | **3. FIRST-YEAR PLANT PROJECTS — ELEMENTARY** | |
| 60 | First-year Plant Projects — Elementary | 76 |
| 61 | Clean Cultivation, Dust Mulch | 77 |
| 62 | Root Study — Turnip | 78 |
| 63 | Fertilizer Identification and Tests | 79 |
| 64 | Scoring Potatoes | 80 |
| 65 | New Kind of Examination — Naming Vegetable Seeds | 81 |
| 66 | Asparagus Growing — School Project | 82 |
| 67 | Instructors Teach Handiest Ways and Set the Pace | 85 |
| 68 | Making their First Hot-bed at the School | 86 |
| 69 | Making Hot-bed for Advisory Committee Member | 87 |
| 70 | "Pricking Out" Lettuce | 88 |
| 71 | Sowing with Seed Sower | 89 |
| 72 | Studying Seed Sower Mechanism | 90 |
| 73 | Studying Capillary Movement of Water | 91 |
| 74 | A City Boy's Project at Bristol County Agricultural School | 92 |
| 75 | Potatoes in Bloom — City Boy's Project | 93 |
| 76 | Both Hand and Horse Work Taught City Boys | 94 |
| 77 | City Boy's Well-rounded Training — Apple Packing | 95 |
| 78 | City Boy Helping Set Up Corn Harvester | 97 |
| 79 | Project Vicissitudes — Frosted Melons | 99 |
| 80 | Projects Suited to Strength | 100 |
| 81 | Village Boy's Back Yard before Studying Agriculture | 102 |
| 82 | Village Boy's Back Yard while Studying Agriculture | 103 |

| FIGURE | | PAGE |
|---|---|---|
| 83 | Improvement Project | 107 |
| 84 | Improvement Project Followed by Productive Project | 107 |
| 85 | Improvement Project — Market Gardening | 108 |
| 86 | The Boy and His Brother Hired to Help | 109 |
| 87 | Farm Boy's Acre | 110 |
| 88 | Part of Farm Boy's Squash Crop | 111 |
| 89 | Forty Acres in Sweet Corn — Boys from Big Farms | 112 |
| 90 | Small Fruit Project — Selecting Strawberry Plants | 113 |
| 91 | Real Estate Dealer Awake to Advantage of Agricultural Department in Local High School | 114 |
| 92 | Bit of Landscape Forestry | 115 |
| 93 | School Flower Garden Aid to Home Flower Garden | 116 |
| 94 | Potting Plants for All Schoolrooms | 117 |
| 95 | Lessons in Lawn Making | 135 |
| 96 | Future Needs Anticipated — Bird's-eye View Plan | 136 |
| 97 | Pupils Planting Shrubs According to Plan | 137 |
| 98 | "Between the Acts" — Cutting a Melon | 139 |
| | **4. SECOND-YEAR SMALL ANIMAL PROJECTS — ELEMENTARY** | |
| 99 | Second-year Small Animal Projects | 139 |
| 100 | Sheep, a Home Project | 140 |
| 101 | Chester Whites, — Clearing Rough Land on Home Farm | 141 |
| 102 | Shoats in the Orchard — Home Project | 142 |
| 103 | Brood Sow on Good Pasture — School Project | 145 |
| 104 | A Vigorous Litter — Essex County School | 146 |
| 105 | Farm Biology — Post Mortem of Pig's Brain | 147 |
| 106 | Studying Beekeeping — School Project | 148 |
| 107 | Home Project in Beekeeping | 149 |
| 108 | Trees in Poultry Yard | 150 |
| 109 | A Pupil's Hatch at School | 151 |
| 110 | Colony House for Young Birds | 152 |
| 111 | Brooding Coops in Home Orchard | 153 |
| 112 | Egg-laying Club Project of Vocational Pupil | 154 |
| 113 | No Two Home Projects Alike | 156 |
| 114 | "For Sale" Bulletin at School | 157 |
| 115 | Studying Artificial Brooding | 178 |
| 116 | Building Coal Stove Brooder House | 179 |
| 117 | Building Poultry Houses in School Arena | 182 |
| 118 | Building "Trial" Project Poultry House at Home | 183 |
| 119 | Village Boy's Back Yard Poultry Project | 184 |
| 120 | Village Boy's Approved Substitute for Second-year Crop Project | 185 |
| 121 | Mangels for Poultry — Home Project | 186 |
| 122 | Supplementary Farm Work for Wages | 187 |
| 123 | Caponizing — Boy Operating | 188 |
| 124 | A Workmanlike Job — Big Poultry House Built by Boy on Home Farm | 189 |
| 125 | Essex County Egg-laying Contest | 191 |
| 126 | Poultry Projects Mean Business — Sometimes Pretty Big Business | 192 |

### 8. THIRD-YEAR PLANT PROJECTS — ADVANCED


| FIGURE | | PAGE |
|---|---|---|
| 127 | Third-year Plant Projects — Advanced | 194 |
| 128 | Home Project on Big Market Garden Farm | 195 |
| 129 | School Cabbage Project — Boys Grew Crop | 196 |
| 130 | Tobacco Farm of Pupil's Father | 197 |
| 131 | Everybody Works, even Father | 198 |
| 132 | Lathing Tobacco | 199 |
| 133 | Passing the Lathes Laden with Tobacco Plants | 200 |
| 134 | The Load on the Way to the Tobacco Barn | 202 |
| 135 | "Trial Project" — Testing Early Tomatoes at School | 203 |
| 136 | Plant Pests. Advisory Committee Member Showing a Class his Potato Sprayer on Wheels | 204–205 |
| 137 | City Boy's Potato Project at Home | 207 |
| 138 | City Boy's Potato Sorter | 208 |
| 139 | Farm Boys — Partnership Market Garden Project at Home | 209 |
| 140 | An Empty Wagon but a Full Pocket | 210 |
| 141 | Bank Books of the Partners | 211 |
| 142 | City Boys — Partnership Project on Hired Land | 212 |
| 143 | Partners Visited by Classmates | 213 |
| 144 | Earnings Report of the Partners | 214 |
| 145 | Partners, "Hired Men" and Instructor | 215 |
| 146 | Substitute for Market Garden Project — Notes in Record Book | 217 |
| 147 | Constant Exploration of Books and Bulletins | 218 |
| 148 | Water Percolation Tests — Related Study | 219 |
| 149 | Certain Schools May Specialize — Apple Harvest | 221 |
| 150 | Low-down, Short-turn Orchard Wagon | 222 |
| 151 | Apple Tree Nursery and Cover Crop | 223 |
| 152 | Good "Air Drainage" and Orchard Cover Crop | 224 |
| 153 | Dwarf Wagener, Six Years Old | 225 |
| 154 | Ontario, Eight Years Old | 226 |
| 155 | Spray on Foliage, Young R. I. Greening | 228 |
| 156 | Dwarf McIntosh, Seven Years Old | 229 |
| 157 | First Prize Box — Won $75 in Prizes | 230 |
| 158 | Village Boy's Orchard Project — Two Years' Lease | 231 |
| 159 | Mounts — Good and Bad Cuts in Pruning | 232 |
| 160 | Varieties of Apples — Laboratory Study | 233 |
| 161 | Cambium Layer — Apple Tree Propagation | 234 |
| 162 | Top-working — Grafting High Quality Strains | 235 |
| 163 | Buckwheat — Renovation of Land for Orcharding | 236 |
| 164 | Keeping the Land Busy — Rape and Crimson Clover | 237 |
| 165 | Looking for Nodules on Clover Roots | 240 |
| 166 | "Coming through the Rye and Vetch" | 241 |
| 167 | Another Type of Soil Improver | 243 |
| 168 | Setting Out an Apple Orchard — School Project | 244 |
| 169 | Setting Out a Peach Orchard — School Project | 245 |
| 170 | Home Project — Starting Apple Orchard | 246 |
| 171 | One of the Trees the Second Summer | 247 |

| FIGURE | | PAGE |
|---|---|---|
| 172 | Learning to Spray by Spraying — School Project | 248 |
| 173 | Pounds of Prevention — Tent Caterpillar Nest Collecting Contest | 249 |
| 174 | Spraying to Prevent Brown Rot of Peaches — School Project | 251 |
| 175 | Boy Cultivating Peach Orchard — School Project | 251 |
| 176 | Careful Picking and Handling Taught | 253 |
| 177 | Both Box and Barrel Packing Taught | 254 |
| 178 | Picking Apples at Home | 255 |
| 179 | His Own Apples | 256 |
| 180 | Orcharding Section of Farm Practice Sheet | 257 |
| 181 | Ipswich River from Turner Hill Orchard | 258 |
| 182 | Arbor Day — Planting Forest Trees | 260 |
| | **6. FOURTH-YEAR ANIMAL PROJECTS — ADVANCED** | |
| 183 | Diagram of Gradation of Projects in Full Four Years Course | 261 |
| 184 | Father Backs the Agricultural Department | 262 |
| 185 | Boys Who Cannot Attend Full Time Not Neglected | 262 |
| 186 | Studying Fine Holsteins at Neighbor's Farm | 263 |
| 187 | Advisory Committee Member Coaching Stock Judging Team | 263 |
| 188 | Diagram of County Agricultural School Education | 264 |
| 189 | Diagram of High School Agricultural Department Education | 265 |
| 190 | Studying "Dolly Dimple," "Queen of the Guernsey Milkers" | 267 |
| 191 | Favorite of School Herd — Ayrshire | 268 |
| 192 | Farm Barns, Essex County School | 269 |
| 193 | Miss Ruth Wood and Her Prize Jersey Bull | 270 |
| 194 | Comparing Weights of Milk and Cream | 271 |
| 195 | Babcock Testing | 272 |
| 196 | Pupils Explaining Babcock Test to Visitors | 273 |
| 197 | Diagram of Minimum Qualifications for Instructorships | 275 |
| 198 | Bad Shoulder — Farm Horse Study at School | 276 |
| 199 | Good Shoulder — Farm Horse Study at School | 277 |
| 200 | Types for Mounts Studied at Neighbor's | 278 |
| 201 | Draft Type Studied at Neighbor's | 279 |
| 202 | School Colt and Boy Who Cared for Her | 281 |
| 203 | School Colt and Boy Who Trained Her | 281 |
| 204 | Barn Construction Studied at School — Contract Job | 282 |
| 205 | Shed for Wagons and Tools Built by Pupils — School Project | 283 |
| 206 | Plan of Farm Drawn by Pupil from Sketch and Measurements | 284 |
| 207 | Dairy and Cash Crop Projects Combined | 285 |
| 208 | Mangels for Cows without Ensilage | 286 |
| 209 | City Boy Mowing Alfalfa with Machine at School | 287 |
| 210 | Curing Alfalfa — School Project | 287 |
| 211 | Boy Raking Hay with Horse | 288 |
| 212 | Boys and Instructor Carting Timothy | 289 |
| 213 | Using Land for Blackboard — Corn Planted Untested | 290 |
| 214 | Contrasted Yields of Fodder — School Project | 291 |
| 215 | Contrasted Yields of Ears — School Project | 291 |
| 216 | Germination Test — Strong and Weak Ears Detected | 294 |

| FIGURE | | PAGE |
|---|---|---|
| 217 | Field from Tested Seed — School Project | 295 |
| 218 | Corn Roots Studied at School | 296 |
| 219 | Ridding Corn Field of Smut | 297 |
| 220 | Pupils Haul Concentrates and Fill Silos | 298 |
| 221 | Academy Graduate Returns Part-time for Agriculture | 300 |
| 222 | Cost Accounting Neighbor's Herd for Pay, in Addition to Home Project | 301 |
| 223 | Cost Accounting Employer's Herd — Substitute for Project | 302 |
| 224 | "Home Project" Permitted by Employer | 303 |
| 225 | Corn Growing Home Project — Seeded at Last Hoeing | 304 |
| 226 | Corn Club Champion | 305 |
| 227 | Pupils Report Results at Public Meeting | 306 |
| 228 | Adult Farmers Ask for Evening Instruction | 307 |
| | **7. HOME PROJECT SUPERVISION** | |
| 229 | Bicycles Help in Supervision | 308 |
| 230 | Horses are Used in Bad Going | 309 |
| 231 | Motorcycles Sometimes Preferred | 310 |
| 232 | Automobiles Most Common in Project Visiting | 311 |
| 233 | Touring Car for Instructor from Subscriptions | 312 |
| 234 | Farmers are Invited to Help | 313 |
| | **8. ARENA TYPE OF BUILDING** | |
| 235 | Arena Type of Agricultural School Building | 316 |
| 236 | Arena Building, Smaller Size | 318–319 |
| 237 | Arena Addition to High School, Proposed | 320 |
| 238 | Auditorium for Live-stock Demonstrations | 322 |
| 239 | Arena and Auditorium Thrown Together | 323 |
| 240 | Building Colony Houses in Arena | 324 |
| 241 | Arena Used for Recreation when Not Used for Study or Work | 325 |
| 242 | Arena Fence Converted into Table | 326 |
| 243 | Poultry Show in Arena | 328 |
| 244 | Poultry Demonstration in Auditorium | 329 |
| 245 | Arena, Morning before Horse Show | 330 |
| 246 | "Earl of Chatham," Prepotent Sire of Race Horses Shown in Arena | 332 |
| 247 | "May Chatham," Sired by "Earl of Chatham" | 333 |
| 248 | High School Horse Shown in Arena | 334 |
| 249 | Arena Ribbons Much Coveted | 335 |
| 250 | Graduation in the Arena — Home-making Course | 336 |
| 251 | Graduation in the Arena — Agricultural Course | 337 |
| | **9. COUNTY CONFERENCES** | |
| 252 | County Planning Conferences | 338 |
| 253 | Tractor Demonstration at Farmers' Show at School | 339 |
| 254 | Luncheon Served by Home-making Department | 340 |
| 255 | "Better Babies" Contest at Smith School | 341 |
| 256 | Arena Exhibit by Manufacturers of County | 343 |

| FIGURE | | PAGE |
|---|---|---|
| 257 | Press Notice of "Get Together" and Exhibit | 344 |
| 258 | Automobile Exhibit in Arena | 345 |
| 259 | Delegates to County Planning Conference | 346 |
| 260 | Both Vocational and Civic Values Realized | 347 |
| | **10. ORGANIZATION FOR SERVICE** | |
| 261 | "I Serve" Diagram of a State Agricultural College | 348 |
| 262 | Diagram of a County Agricultural School Organized to Serve | 349 |
| 263 | A Community Not United | 352 |
| 264 | Steps in Community Organization | 354 |
| 265 | A Long-term Program of a United Community | 356 |
| | **11. PROFESSIONAL IMPROVEMENT** | |
| 266 | Example of Professional Improvement Opportunity | 358 |
| | **12. "CONFERENCE ON WHEELS"** | |
| 267 | Shetland Pony Breeding Farm Visited | 360 |
| 268 | Hackney Horse Breeding — "Marlboro" | 362 |
| 269 | "Seaton Saxton," Son of "Marlboro," at Six Weeks Old | 363 |
| 270 | Mr. Spencer Borden's Arabs and Arab Crosses. "Scimmeter" in Army Service | 364 |
| 271 | A Sister of "Scimmeter" in the Show Ring | 365 |
| 272 | "Segario," Sire of "Scimmeter," Owner Up | 366 |
| 273 | "Halcyon," Famous Long-distance Mare, Dam of "Kingfisher" | 367 |
| 274 | "Kingfisher," Col. (then Maj.) Frank Tompkins up, on Villa Raid in 1916 | 368 |
| 275 | "Kingfisher" at End of Villa Raid | 370 |
| 276 | "Kingfisher" Winner of Blue, in 1918 at Camp Devens, for Best Officer's Mount | 371 |
| 277 | Draft Horse Breeding — A Prepotent Sire | 372 |
| 278 | "Jess of Craigwillie," Sired by Grand Champion "Fairholme Footprint" of Langwater Farms | 373 |
| 279 | Owner of Langwater Farms, Host of 1917 "Conference on Wheels" | 374 |
| 280 | Conference on Wheels Stopping at a School | 375 |
| | **13. RECREATION** | |
| 281 | Athletic Field | 376 |
| 282 | Inter-county School Meet — Contests both Agricultural and Athletic | 377 |
| 283 | Baseball after Haying | 378 |
| 284 | Annual Rope-pull Across School Pond | 379 |
| 285 | Steers Trained by Pupil to Do Tricks | 380 |
| 286 | Community Pageant in Which Pupils and Instructors Participated | 382, 383 |
| 287 | Play Presented by Pupils | 385 |
| | **14. RECORD BLANKS AND OTHER FORMS** | |
| 288 | Score Card for Efficiency of an Agricultural School or Department | 387 |
| 289 | Farm Survey Card — An Example | 389 |
| 290 | Application and Agreement, Front of Day Class Card | 390 |

| FIGURE | | PAGE |
|---|---|---|
| 291 | Facilities for Farm Practice Survey, Back of Day Class Card | 391 |
| 292 | Example of Report of Facilities for Farm Practice of All Pupils in a Department [For Section from Farm Practice Record Blank, see Fig. 180] | 392–395 |
| 293 | Projects Must Meet Individual Needs — Needs of Cranberry Growers, for Example | 396–397 |
| 294 | Evening Class Project Agreement Card — Front | 400 |
| 295 | Evening Class Project Agreement Card — Back | 401 |
| 296 | Seasonal Plan of Instruction — Kitchen Gardening | 403 |
| 297 | Seasonal Plan of Instruction — Poultry Keeping | 404–405 |
| 298 | Seasonal Plan of Instruction — Fruit Growing | 408 |
| 299 | Example of Boy's Daily Record | 410 |
| 300 | Example of Boy's Monthly Summary | 412 |
| 301 | Example of Boy's Detailed Cow Account | 414–415 |
| 302 | Example of Boy's Annual Summary | 418 |
| 303 | Example of Instruction and Supervision Memorandum | 427 |
| | Front of State Supervisor's Record of Home Project Inspection | 453 |
| | **15. SUMMARIES OF EARNINGS OF PUPILS** | |
| 304 | Earnings of Pupils since 1911–1912 | 429 |
| | **16. LIFE HISTORY RECORDS — AN EXAMPLE** | |
| 305 | Stanley Bartlett, Employed on Hood Farm Jerseys | 442 |
| 306 | Stanley Bartlett's Dairy Home Project and Present Place of Employment as a Graduate | 443 |
| | **17. BIRTHPLACE OF THE HOME PROJECT** | |
| 307 | Arena Type of Classroom and Administration Building. Arena design sketched by the author. Smith Agricultural School, Northampton, Mass. | 450 |


# ACKNOWLEDGMENTS

FOR the use of photographs or negatives, from which certain of the above listed illustrations were made, the author is deeply indebted to those for whom, or by whom, the pictures were taken. The pages on which the cuts appear are listed below; and the persons to whom the author desires to express his hearty thanks are as follows, the names being arranged in alphabetic order: Mr. C. S. Bartlett, 442–443; Mr. Warren K. Blodgett, 49, 147, 212, 213, 215; Mr. Spencer Borden, 364–370; Mr. L. B. Boston, 140; Mr. H. E. Botsford, 99; Mr. W. H. Bronson, 80, 107–109, 310; Mr. E. J.

Burke, 85–89, 139, 197–202, 235, 249, 255, 262, 263, 266, 297, 305, 358; Connecticut River Stock Farm, Mr. Fralig, Manager, 332; Mr. I. G. Davis, 87, 205; Mr. W. H. Dickinson, 333; Mr. A. W. Doolittle, 60, 77, 100, 186, 187; Director G. H. Gilbert, 94, 150, 151, 241, 243, 251, 268, 281, 282, 287–289, 298, 339, 378, 379; Hood Farm, Mr. Dodge, Manager, 442; International Film Service Inc., 270; Mrs. W. A. King, 360; Director F. W. Kingman, 318, 319, 372–374; Director H. N. Loomis, 82, 245, 277, 283, 336–338, 340, 341, 343, 345, 385; Judge W. H. Moore and his Manager, Mr. George Chipchase, 362, 363; Mr. J. G. Powers, 102, 103; Director F. A. Smith, 46–49, 55, 78, 142, 145, 147, 188, 191, 196, 203, 212, 213, 215, 221–229, 230, 231, 236, 253, 254, 258, 269, 296, 349; Director C. R. Titlow (W. Va.), 348; Colonel Frank Tompkins, 371; Underwood and Underwood (N. Y.), 368, 370; United Cape Cod Cranberry Company, 396; United States Department of Agriculture, 305; and Mr. R. W. Williams, 192.

The illustrations on the other pages of the list, not otherwise credited on the pages where they appear, are photographs and drawings made either by the author or under his direction.

# INTRODUCTION

WHEN in 1906 Massachusetts began to develop state-aided vocational education, including agricultural schools, the State Commission on Industrial Education had the duty of approving directors for the schools and teachers for the classes. Among the schools for which state-aid was desired, the Smith School of Northampton, for the establishment of which a fund had been held in trust and permitted to accumulate for sixty years, came under the supervision of the State. The Trustees of this School and the Commission on Industrial Education, having sought diligently for a suitable director, found R. W. Stimson, then President of the Connecticut Agricultural College, to be just the man they wanted. Mr. Stimson thus became the director of the first vocational agricultural school in Massachusetts. He designed the arena type of agricultural school building, and began his studied and persistent effort to link school and home farm together in what has since become widely known as the home-project plan of vocational agricultural education. He also served the Commission as special agent for the purpose of extending this type of education.

When in 1909 the Massachusetts Board of Education was reorganized, and when the Commission on Industrial Education was abolished and its work became part of the work of the reorganized Board, Mr. Stimson was continued as special agent. He made the survey ordered by the Legislature of 1910 to determine whether or not there ought to be a system of vocational agricultural education in this Commonwealth; and helped formulate the report. The next Legislature approved the recommendations in this report and provided state-aid for both separate schools and departments in high schools in which the home-project plan of agricultural education should be followed. In 1911 Mr. Stimson resigned as director of the Smith School, and became the agent of the Board for the supervision of the state-aided system of agricultural schools and departments. As Chair-

man of the Commission on Industrial Education and as a member of the Board of Education, I have been in close touch with Mr. Stimson's work for eleven years.

Massachusetts has been fortunate in the services which Mr. Stimson has rendered. His development of the "project" method of teaching agriculture in our rural communities, as contrasted with the "subject" method, has been much to the advantage of all concerned. He has, of course, been a student of agricultural education in other states and countries, and has known how to render available for Massachusetts the results of his studies elsewhere.

An introduction to his book seems to me unnecessary; because the book will carry its own message effectively. But, since I have observed the development of the home-project plan closely from the beginning and he has invited me to write an introduction, I am happy in this way to express my hearty appreciation of Mr. Stimson's aims and methods, and of the results which he has achieved. I do not see how his book can fail to interest and stimulate all workers in the field which it covers.

PAUL H. HANUS.

# VOCATIONAL AGRICULTURAL EDUCATION

# VOCATIONAL AGRICULTURAL EDUCATION

## CHAPTER I

### VOCATIONAL AGRICULTURAL EDUCATION

#### 1. Education

DEFINITION and agreement as to terms are important aids to profitable discussion. We are all pretty well agreed as to what is meant by education. Education, as the derivation of the word suggests, means the drawing out and development of the best capabilities latent within the individual.

(1) **Modern versus medieval.** — In modern usage, education means beginning to draw out the powers of the individual at the earliest possible minute in the child's life, and the continuance of carefully studied efforts for the development of those powers well on into young manhood and womanhood. We do not wait for the child to come to the primary school, or even to the kindergarten; we hold mothers' meetings in order that we may begin with the babe.

He who visits Harvard University, on entering the main gate leading to University Hall finds on his left old Harvard Hall, the tongue of whose belfry has called generation after generation of young men to lectures and to prayers. On his right he finds old Massachusetts Hall. The Old South Church across the Charles in Boston has been called the birthplace of American liberty. Faneuil Hall, Boston, has been called the Cradle of Liberty. In a very important sense old Massachusetts Hall might well be called a schoolhouse of liberty, — so many succeeding classes of young men, afterwards potent in centers of influence, have been schooled within its walls in the history and principles of American freedom.

A niche has been built into the front of this old colonial building. When the class of 1883 was deciding who might most appropriately occupy that spot, they chose a man who has been called by one of our hard-working scientific men "perhaps the best poet for the working man," James Russell Lowell. And when the sentiment to appear on the pedestal beneath the bronze bust was chosen, these were the words cut into the marble:

I, Freedom, Dwell With
Knowledge: I Abide
With Men By Culture
Trained and Fortified.

From the first moment, American freedom has been joined to knowledge; Americans everywhere — selected Americans — have been trained and fortified by the cultivation of their higher and finer powers. We have sought the safety of democracy in education.

The period since our Civil War is one of most extraordinary interest to the student of the history of teaching. While eradication of ignorance and development of personal power have been constant aims, there have been marvelous changes in means and methods. During much of this period there has been one great slogan, "Mental discipline."

For eight hundred years one type of training had dominated the schools. The first higher school of our fathers was to no small extent a survival of the Middle Ages, those twilight days one of the "idiosyncrasies" of which was a "mystical reverence" for the number seven. There were "seven planets," "seven metals," "seven days in the week," "seven apertures in a man's head," "seven cardinal virtues," "seven deadly sins," "seven sacraments." It probably was more than merely a coincidence that studies had been divided into groups of three and four. Grammar, Logic, and Rhetoric constituted the so-called *Trivium;* Arithmetic, Geometry, Astronomy, and Music made up the so-called *Quadrivium.* Until recently, education, not only in colleges, but also in secondary schools — education claiming for its watchword "Mental discipline"— has been very largely of the language-number, of the *Trivium-Quadrivium,* type.

While the casements in the Capitol at Washington were still rattling with the cannonading across the Potomac, however, there came signs and portents of change. The names of Darwin and Wallace, Huxley and Tyndall, Louis Agassiz and Asa Gray, were commanding attention and respect. That is to say, powerful influences for change were at work even within the schools and colleges themselves.

Perhaps of keenest interest to us to-day are two influences which, as the years have passed, have exerted marked modifying power; — both acting on established education, not from within the schools, but from without.

(2) "**What knowledge is of most worth?**" — It is not far from fifty years ago that Mr. Herbert Spencer put into print, and challenged the public with, the question: "What knowledge is of most worth?" Answering for himself, he said: A. That knowledge which has to do with self-preservation. The little babe's eyes must be protected from the bright light lest they suffer harm. His first steps must be steadied lest he fall. Berries good for food he must be taught to pick, not berries from bushes which poison. As the years advance, every stage of life calls for special care lest the body suffer injury. All things which have to do directly with self-preservation are of the first importance. B. That knowledge which has to do indirectly with self-preservation. Here Mr. Spencer referred to training which develops power to earn a livelihood. All occupational knowledge is here included. The body must not only be protected from harm, it also must steadily be sustained and promoted in well-being. C. That knowledge which has to do with parenthood, including all training necessary for the creation and well-being of family life. D. That knowledge which is conducive to social or community welfare. E. Finally, that knowledge which has to do with the graces and refinements of life, including literature, music, — fine art in all forms.

Mr. Spencer's discussion was of unusual value, owing to the breadth and thoroughness of his treatment of education. It was unique for the order in which he stated the objects of knowledge and their relative worth. Before art and refinement, he put social and community well-being. Before knowledge of history and politics, he put knowledge of parental functions and obligations. Before all these he put

that elemental knowledge which has to do with vocational efficiency.

What gave Mr. Spencer's contribution its most searching pedagogic importance was his insistence on the relatively higher educational value of vocational knowledge for the average student in the average college and no less for the average pupil in the average school. The school men could not escape his psychology nor his logic. The friends of the common people received his message gladly. Almost immediately his doctrine crossed to the continent, and there was translated into French, German, Italian, Russian, Hungarian, Danish, and Dutch. Simultaneously it crossed the Atlantic.

In short, Mr. Spencer and those who espoused his views, or something like them, once for all protested against the domination of the familiar ideal in education, that mental discipline was the supreme thing. Knowledge, to be of worth, must not only train the mind; it must also furnish it for the immediate, pressing, practical affairs of life.

(3) "**Liberal and practical.**" — Parallel with the scientific and philosophical treatment of education by Mr. Spencer came the establishment and development of the land-grant colleges, a movement, again, which originated outside the schools. It sprang from that remarkable farmer, blacksmith, village banker, and for many years influential member of Congress, the late Senator Justin S. Morrill of Vermont. Mr. Morrill contended that Congress and the legislatures of the several states ought to unite in furnishing a "liberal and practical" education. We should equip all young men and all young women for success in life; some for usefulness in the learned professions, others for success in the great, basic, economic industries. The history of the development of the land-grant colleges need not here be traced, so familiar with it are we all, and so profoundly convinced are we of the educational wisdom and foresight of this past master of public affairs.

The practical program of Mr. Morrill, like the educational ideas of Mr. Spencer, met with opposition but prevailed in spite of it. The first Morrill bill, as Dr. Abram Harris has reminded us, was vetoed by the "gentleman-president," James Buchanan; the Morrill Act of 1862 was approved by the rail-splitter, Abraham Lincoln.

(4) **Practical and liberal.** — Happily, as the years have passed, the new education and the old have been joining hands. The old college has affected the new, and the new college has modified the old. The training in the new college, Mr. Morrill said, must be liberal and practical. The education in the old college, leaders to-day are demonstrating, may be both practical and liberal.

So imitative of the college is the school, in both spirit and methods, that we may almost say, "As does the college, so does the school." Thus the new college spirit and methods are doubly significant. The brother of a Harvard student came to Cambridge on a visit. As a boy he could never be made to apply himself to books, because school books did not seem to him to apply to life. Once out of the grip of the compulsory attendance law, he left school and learned the plumber's trade. During this visit, he went with his brother to a lecture in a course in ethics called "Philosophy 3," presented by Professor George Herbert Palmer. It was not "Philosophy 1," an elementary course; nor yet "Philosophy 2." It was a decidedly advanced course in the midst of which he spent that hour. Knowing the family circumstances, the author was exceedingly curious to learn what would be the effect on such a man's mind of modern Harvard; and at the close of the lecture asked him how he liked it. His answer was illuminating. "That," he said, "is what I call getting right down to brass tacks!"

Harvard is typical of the best, in her aims and in her methods. Individual freedom achieved by cultivation, teaching getting right down to the brass tacks of living, this, to-day, is education at its best.

(5) **Not a matter of a moment.** — Four years in high school, four years in college, and three or four years in a professional school we do not consider too much time for the proper education of him who shows aptitude for a professional career, whether in medicine, divinity, law, engineering, or, more recently, in business administration or in agriculture. On the whole, we believe that he is best prepared to do the things the world wants done who is longest and most carefully trained. And our pronoun "he" is used in the generic sense, — our belief as to the demands of long and thorough training applies to the development of talent, without discrimination as to sex.

### 2. Vocational Education

Vocational education, as defined in Massachusetts, includes all forms of specialized education the controlling purposes of which are to fit for useful occupations. The aims of vocational education here are, therefore, to draw out and develop the vocational capabilities of the individual.

There are those who think that for the practical boy, as distinguished from the bookish boy, vocational education might well begin before the fourteenth birthday. In the elementary schools, shop work, gardening, elementary agriculture, and instruction in household arts may render an important service by helping children to test their native abilities and discover their special aptitudes. These elements of the public school curriculum have been found valuable aids to intellectual progress; and, no doubt, in certain cases, have helped wise choice of the type of schooling later to be followed. They may have strong pre-vocational or vocational guidance values.

(1) **For those over fourteen.** — In Massachusetts, however, there has been no effort, in legislation or in the general policy of the Board of Education, to invade the elementary schools with vocational education. On the contrary, vocational education addresses itself to those who no longer are thrust into the schoolroom by the strong hand of the compulsory school attendance law, but who are free to go to school longer or to stay away according as they themselves, or their parents, may determine. Vocational education in Massachusetts, for which state aid has been provided and for which federal aid is now available, is, in short, organized and conducted with direct reference to meeting the requirements of pupils fourteen years of age or older. Vocational education is, moreover, definitely and frankly vocational. It undertakes to train the pupil for farming, for homemaking, or for some trade or industrial pursuit.

(2) **Of less than college grade.** — To the extent that a school or college leads to mastery of tools, whether mental or mechanical, required for success in the chosen occupation, its education is vocational. On the outer gate, within a stone's throw of the Lowell memorial above referred to, one reads the ancient inscription that the primary object

in the founding of Harvard College was to protect the children of the colonists from the legacy of " an illiterate ministry." The first educational undertaking at Harvard was the making of ministers, an undertaking definitely vocational. To the extent that higher institutions, including the land-grant colleges, are practical as well as liberal in their aims, equipment, and methods, their education, of course, may be vocational.

But the vocational education described in detail in the following pages is intended to be of less than college grade. Its purpose, that is to say, is not to displace other schooling, but to fill a gap in education for pupils of high school age and to provide short units of training for those in later life who were without this type of training in their high school years.

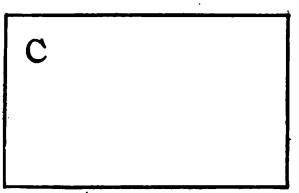



FIG. 1. — We may represent secondary education of the earlier years by a capital "C." It prepared for college. Classical studies and mathematics were strongly featured. "Mental Discipline" was its cry. It was excellent for a few.

(3) **Vocational versus cultural.** — High school education of the strongly cultural type, where classical studies, mental discipline, and preparation for college have engaged the energies of the pupils, has been held in high estimation. We have looked up to it. Mr. Emerson said, " Hitch your wagon to a star." Proponents and exponents of this type of training have said, " Behold the star of education. To this we hitch our wagon." Because schools of this type have so greatly multiplied, because our young people have thronged to them in such numbers, because our best high schools are so much better than many of the colleges of earlier days, but also because such a vast majority of these young people end their institutional education on completion of their high school courses, the American high school has been called the " People's College."

The cultural high school has had our approval. To prepare for college and to give general education, the cultural high school is excellent. Indeed, no country in the world has equaled our own in the development of such training. We are now talking in terms of war. Prior to the outbreak of our Civil War, there were not forty

public high schools in the United States. At the outbreak of the war with Germany, we had twelve thousand such high schools. A decade before our war with Spain, the enrollment in these schools was hardly two hundred thousand. At the outbreak of the present war, their enrollment had reached almost one million two hundred thousand, or "a growth that has been at least ten times as fast as that of the population." Professor W. C. Bagley, who has assembled these figures, has declared this to be "the most significant triumph of American public education during the past half century." And he has added, "Not only is this true, but we have in the public secondary schools of the United States almost as many pupils as there are enrolled in the secondary schools of all the rest of the civilized countries combined, — in spite of the fact that our period of secondary training covers only four years as against six, eight, or nine years in most other countries."[1]

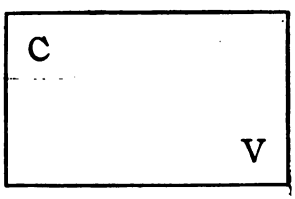



FIG. 2. — Because so few were attracted to the earlier secondary education, or because so many were repelled by it, adventures were made with a new type of education, called vocational. We may represent this by a capital "V." It aimed to begin with the fundamental needs of those who desire to follow practical, as distinguished from professional, pursuits.

**A. Limited appeal of cultural education.** — The trouble has been that, of the host of young people of high school age, so few have continued in school. Everybody has noticed the enormous falling off in school attendance at the fourteenth birthday. Employers have noticed, too, that those who have presented themselves for work at fourteen have neither been prepared for good work, nor possessed of such mental ability as they have thought public school education ought to give before releasing pupils for labor.

A result of observations such as these was the appointment in Massachusetts, in 1905, of the so-called Douglas Commission on Industrial Education, of which the late Carroll D. Wright was chair-

[1] "Principles Justifying Common Elements in the School Program," an address by Professor W. C. Bagley at University of Illinois, High School Conference, November 19, 1914. For abstract, see December, 1914, number of *School and Home Education*.

man, and which undertook for the Legislature a careful study of the conditions in this state with a view to their improvement.

**B. Schools of privilege.** — Twenty-five thousand boys and girls were found, fourteen to sixteen years of age, who were not in school and who were not at work, or who, if at work, were engaged in temporary or "dead end" occupations. Asked why they were not in school, they replied with astonishing unanimity that there was "nothing doing" in school for them. They had a feeling that the schools had nothing to give them which would help them to earn a living, and that, in general, the high schools were being "run" for the benefit of those who were to follow clerical or professional careers, not for those who were to enter industrial or agricultural life. Their parents agreed with them, and added that it cost a great deal to keep children in school; that out of school there was a saving on clothing and car fares; that work, even at odd jobs with very little pay, still yielded some income toward the support of the family.

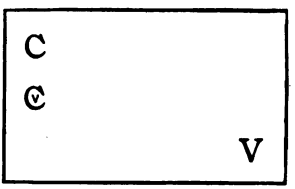



FIG. 3. — There is scarcely a high school to-day of the earlier type. Most large high schools have differentiated their courses, in terms of probable careers of their pupils. No one course is now held to be best for everybody.
The modern high school, therefore, has vocational characteristics and may be represented by the modified symbol above suggested.

**C. Schools of protest.** — The Douglas Commission, therefore, recommended that a permanent commission on industrial education, including agriculture, or at least such a commission to serve for a period of years, be appointed to study the matter further, with power to aid in the establishment of industrial schools for the express benefit of boys and girls fourteen years of age or older who, in the absence of such schools, as experience had shown, would not be in school at all. The Legislature appointed another commission, of which Professor Paul H. Hanus of Harvard was made chairman, and provided state aid for those communities which should establish independent industrial or agricultural schools, to the amount of one half the cost of maintenance, on condition that the new schools must first be approved as to courses, location, and methods of teaching by the Commission.

**D. An army out of school.** — Almost immediately the new Commission found that to the twenty-five thousand out of school reported by the Douglas Commission, thousands more must be added. The following brief statement regarding the situation was made later, after the work of the Commission had been taken over by the new Board of Education, by Mr. C. A. Prosser, then Deputy Commissioner of Education for Massachusetts:

FIG. 4. — Moreover, as time has passed, vocational education has developed pronounced cultural values; so much so, that a better symbol for the modern vocational school or department is needed. Such a symbol is suggested above at the right.

"A conservative estimate would be that every year in the State of Massachusetts from twenty-five thousand to thirty thousand boys and girls, on reaching the age of fourteen, leave the schools to go to work. This army is four times as large as the group which at approximately the same age enters the high school. Only one out of six of these children of tender years taking up some wage earning occupation has reached the eighth year or grade of the elementary schools; only one out of every four has attained the seventh year; only one out of every two, the sixth year."

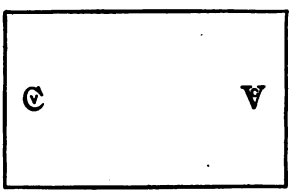



FIG. 5. — We shall probably make best headway, therefore, by recognizing distinct fields for two well-defined types of secondary education: the modern high school with some differentiation of courses, and the modern vocational school with cultural values. Neither is higher nor lower than the other. They are on a level, but in different fields.

This book deals with the type represented by the symbol at the right.

In *Two States*, January, 1912, a magazine published by the Young Men's Christian Associations of Massachusetts and Rhode Island, Mr. William Chandler Smith, Educational Secretary, graphically indicated the trend away from school by means of photographs. Beginning with a group of one hundred pupils entering a public school, he showed fewer than fifty at the fifth grade, thirty-five at the sixth grade, twenty-three entering the seventh grade, fifteen eighth-grade graduates, and three graduates from high school.

**E. A problem of conservation.** — We talk about the conservation of natural resources. Here is a grave problem; for what can compare

in importance, to the nation or to any commonwealth, with the proper conservation of two or four years in the lives of thousands of boys and girls, hurried forward by the years toward maturity in a mass disordered and unimproved? Here are thousands on thousands

FIG. 6. — From Vol. 1, No. 2, April, 1918, of *Young America's Opportunity*, published by Bureau of Educational Service, Boston University, Boston, Mass., to create, stimulate, and direct interest in the continuation of educational preparation, and in the molding and stabilizing of American Ideals.

The agricultural instructor will find issues of this paper valuable aids in efforts to keep boys from dropping out of school.

whom the traditional high schools have either failed to hold or have positively repelled. And no inconsiderable portion of this number consists of farm boys and girls, who, in the absence of education suited to their needs, have dropped out of school on reaching their fourteenth birthdays.

"They are a worthless lot. You can't do anything with them!"

Such a statement as the above, which was made in 1910 by a man in the western part of our state, was impossible of acceptance. Granted

that some on close acquaintance will be found to be incompetent, fit subjects for schools for defectives; granted, also, that some will prove to be incorrigible, fit only to be handled by some reformatory or restraining institution. There still remain the great mass who are neither defective nor incorrigible. For these something can, something must, be done.

Nor was it possible, with equanimity, to take the ground assumed at about the same time by another of our citizens, an educator of some prominence, who said he was not so sure, after all, that it is not a good thing for most boys and girls to leave school at fourteen.

"In the next two or four years," he said, "they will be doing two good things — growing up, and learning to mind. Most boys think obedience is a peculiar requirement made by parents and schoolmasters. The boy discharged from one job, then from another, for a few times, on account of carelessness or disobedience, will at last learn that obedience — discipline, ability to take orders and carry them out promptly and exactly — is one of the fundamental necessities of society. Life itself in the workaday world is one of the best teachers of this important fact. Given a boy grown up and taught to mind, and you can do something with him."

Advocates of vocational education desire physical fitness and moral tractability, but have believed these can best be secured by well-ordered vocational education.

Confession is good for the soul. An important confession for us all has been made by the Hon. William C. Redfield, Secretary of Commerce, in his Introduction to the book by Lapp and Mote on "Learning to Earn" in the following words:

"We are just beginning to realize that by the failure of some phases of our educational systems to meet the living needs of living boys and girls, we are permitting them to enter a sort of death in life which is having most hurtful effects on our country. Our complacency over the value of the common school to our people is being rudely disturbed, for many if not most of our young people emerge from that same common school quite without adjustment to the daily life they must hereafter lead, and almost if not altogether without the training fitting them for the workaday world in which they must live. . . . None of us can be satisfied to allow things to remain educationally as they are; to permit our children to go out into a life which is a blind alley; to reach a mental 'impasse' before maturity is well begun."

The serious problem of vocational education, we see, then, is the conservation of the natural resources of childhood, particularly the

years fourteen to sixteen or eighteen, by educational methods which naturally and effectively appeal to the active, but non-bookish, boy

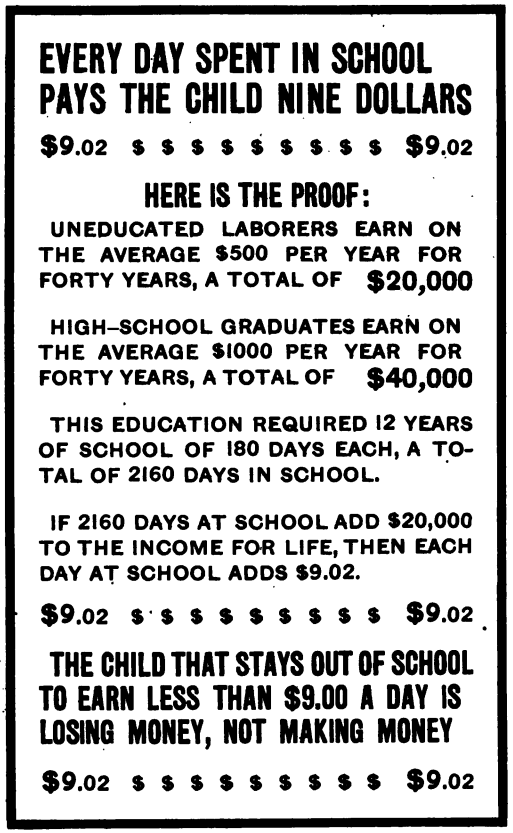



FIG. 7. — A chart from U. S. Bureau of Education Bulletin, 1917, No. 22, "The Money Value of Education." By A. Caswell Ellis, Professor of the Philosophy of Education, University of Texas.

and girl. Mr. Frederick P. Fish, Chairman of the Massachusetts Board of Education, has well put the case for what might be termed an irreducible minimum of justification for vocational education.

"Sad is the lot," he says, "of the ordinary boy or girl who leaves school and goes to work at fourteen. The skilled employments have no place for such; they are

likely to drift into the very lowest grades of work and stay there for the rest of their lives. If the vocational school were of no value except as a device to keep at school for an additional two years those who would otherwise go to work prematurely, its existence would be justified."

**F. Individual versus mass.** — Vocational education, it is evident, has a massive problem. Its central concern, however, is not with the mass but with the individual. In the rush of school work the class has sometimes blinded both administrator and teacher to the

**Education and farm income in New York.** — Warren and Livermore, of Cornell, made a study of 1303 farmers in four townships of Tompkins County, N. Y. They found that no college graduate had been reduced to the position of a renter, and that only 17 per cent of the renters had more than the district-school education. The average labor income was as follows:

| | Per Year |
|---|---|
| Of 1007 with district-school education | $318 |
| Of 280 with high-school education | 622 |
| Of 16 with college education | 847 |

Of those with high-school education, 20 per cent were making over $1000 per year, while only 5 per cent of those with district-school education were making that much.

Fig. 8. — From "Education of Farmers," Cornell University Bulletin 295, reprinted in "The Money Value of Education," referred to on page 13. See also Figures 6 and 7, on pages 11 and 13.

individual, — fit cause for repentance. He who would enter seriously on vocational education may well be admonished by these memorable words of Edward Howard Griggs, in his preface to "The Story of a Child," by Pierre Loti:

"There are always two points of view possible with reference to life. From the standpoint of nature and science, individuals count for little. Nature can waste a thousand acorns to raise one oak, hundreds of children may be sacrificed that a truth may be seen. But from the ethical and human point of view the meaning of all life is in each individual. That one child should be lost is a kind of ruin to the universe."

# WORKING CONDITIONS IN VOCATIONAL SCHOOLS

## "A REAL JOB"

**Apprentice at work in Fore River Ship Yard with Skilled Mechanics**
**Alternate Weeks in School and Yard**

**Work under Such Conditions Spurs to Competition**

FIG. 9. — Helping to produce a wholesome and abundant food supply for a locality or for a nation also is a "real job." A chart prepared by Mr. Charles R. Allen for the Massachusetts Vocational Educational Exhibit at the Panama Pacific Exposition.

And he who would participate in vocational education, whether as pupil or as instructor, might well adopt for his platform of action these recent declarations by Dr. Lyman Abbott:

"The object of education should not be to run all pupils into the same mold. The school should not be a foundry. The object should be to give every pupil a chance to grow. The school should be a garden. Education, therefore, should prepare for life, which is itself the larger education. It should be adapted to the present conditions and the prospective needs of the pupil. The growing recognition of this truth has created optionalism in education, has added industrial training to academic education, has provided, as never before, for woman's education. To enjoy an opportunity for education is the right of every individual; to make that opportunity so varied as to meet the varied needs of the members is the duty of society; to avail himself of the opportunity to make all of himself that he can make is the duty of every individual." (Knoll Papers, *The Outlook*, April 17, 1918, p. 616.)

(4) **Education by action and affairs.** — We are likely to overrate books and to underrate affairs as educational forces. At the Atlanta banquet of the association now known as the National Society for Vocational Education, President Elmer Ellsworth Brown, then United States Commissioner of Education, at first gasp took his audience by surprise when he declared:

"It was not until the nineteenth century that even one-half of the civilized world had been to school; that anything like one-half of the civilized world had learned to read and write and had come under the influence of the school. . . . The people of the world, even at the present time, have barely begun to go to school."

And yet the world has been getting on, human good added to human good by gradual degrees. Your David Harum may not be long on book learning, but he is not short on wit; the deacon cannot beat him twice on a horse trade. Men school each other. Honesty is found to be the best policy. Nature, that sometimes kind, sometimes stern teacher, schools all. Life is a labyrinth of educational forces. Vocational education relies heavily on the activities and actualities of the economic world. Its task is to select or to arrange courses of training that shall not be wanting in either human worth or educational efficiency.

In short, vocational education turns as much to action and affairs as it does to books and schoolrooms for its teaching materials and

methods. And in this it does not concede that its task or its pupils are inferior to those of any other branch of education. Some of the brightest boys in school are to be found in vocational classes. In training boys and girls for life, there is no proper place for snobbery. Vocational training is not higher, cultural training is not lower, as such, on the ethical and human scale, nor *vice versa*. They are different. Each must have its own methods, its own standards, and its own rewards of merit.

For a few years, centering about 1908, feeling in Massachusetts, as elsewhere, ran high and there was extreme bitterness of statement. In education, no less than in politics, there were the stand-pat and the insurgent. To those who said they had hitched their wagon to the star of the older education, proponents of the newer said, in effect: "Yes! You have made the star hitch. But you have forgotten the wagon! You are all up in the air! We are on the ground. We know what we are doing and where we are going." Old school men said vocational education, if not a device of the devil for the undoing

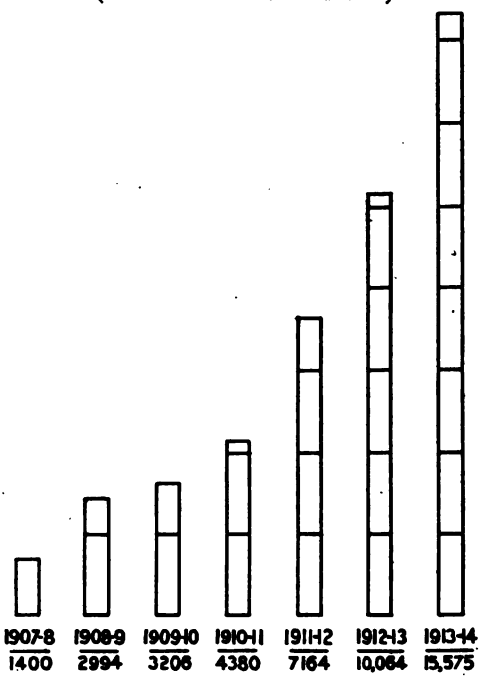



FIG. 10. — Massachusetts did not stampede toward vocational education. From 15,575 in 1913–1914 the enrollment had grown in 1916–1917 to 23,073. This and four following statistical charts were prepared by Mr. Chester L. Pepper, Agent for Industrial Education of the Massachusetts Board of Education, for the Panama Pacific Exposition.

VARIATION IN ENROLLMENT BY TYPES OF VOCATIONAL SCHOOLS

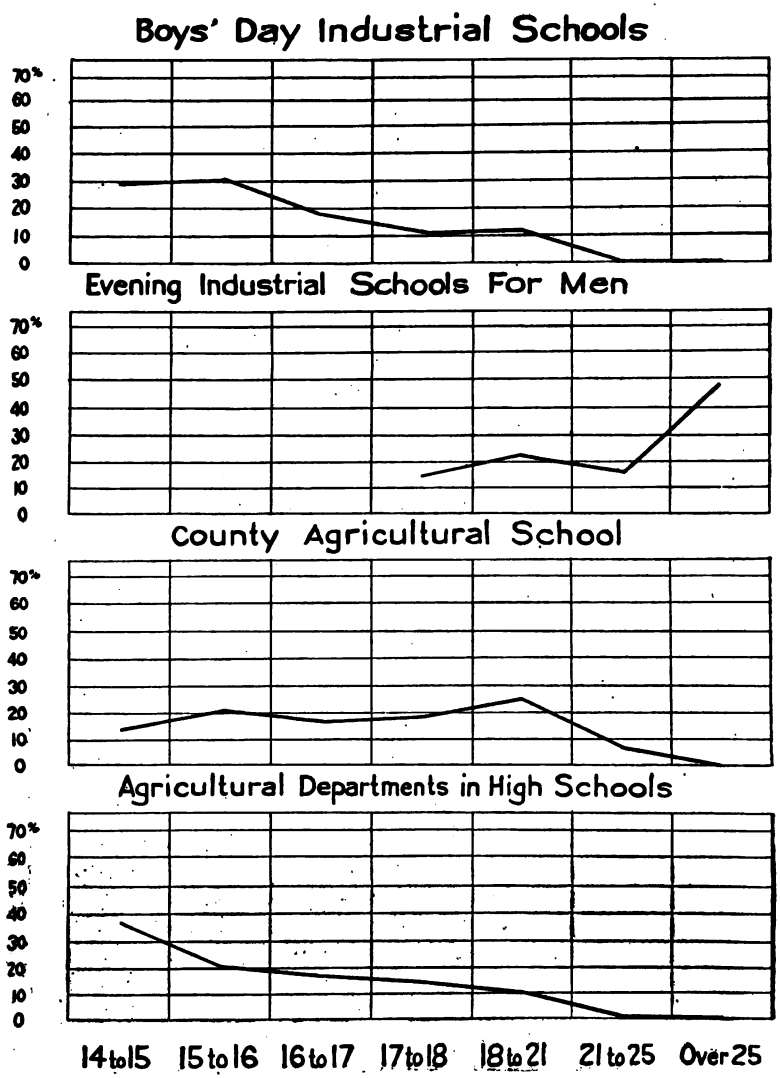



FIG. 11. — Another self-explanatory chart prepared for the Panama Pacific Exposition. It will be noticed that boys at the separate and county schools average somewhat older than those in high school departments.

of centuries of educational progress, was at best another device for exploitation of employee by employer. The vocational school men declared that any man who would make such a statement as the latter was a "public enemy." Thus there came to be sharply defined approval traditions and traditions of protest.

Happily all such bitterness is past. There are now two deputy commissioners of education in Massachusetts, one for vocational education, the other for non-vocational. Both serve under a single commissioner and a single Board of Education, who are equally and impartially responsible for the utmost development of all phases of education, whether for the deaf or the hearing, for the blind or the seeing, for children of the poor or children of the well-to-do; whether by schoolrooms and books, or by action and affairs, or by a combination of both; whether for one or for another useful career.

### 3. Vocational Agricultural Education

(1) **Definition and development.** — Agricultural education, as a phase of vocational education, has recently been defined, by the subcommittee on agriculture of the Commission of the National Education Association on the Reorganization of Secondary Education, of which the author is a member, as that education which is of less than college grade, which is designed to meet the needs of pupils over fourteen years of age who intend to follow agricultural pursuits, which gives the skill and knowledge necessary to the control of plant and animal production to the end of economic profit, and which is so articulated with other education as to promote the most desirable farm community life.

Such a definition is in keeping with the requirements of the Smith-Hughes Act,[1] which provides federal aid for the promotion of vocational education, namely, "that the controlling purpose of such education shall be to fit for useful employment; that such education shall be of less than college grade and be designed to meet the needs of persons over fourteen years of age who have entered upon or who are preparing to enter upon the work of the farm . . .;" and that the

[1] Section 10 of the Act (S. 703) passed by the Sixty-fourth Congress and approved February 23, 1917.

school giving such education " shall provide for directed or supervised practice in agriculture, either on a farm provided for by the school or other farm, for at least six months per year."

Such a definition is consistent, also, with that found in the Massachusetts law,[1] which reads, " ' Agricultural Education ' shall mean that form of vocational education which fits for the occupations connected with the tillage of the soil, the care of domestic animals, forestry, and other wage-earning or productive work on the farm."

PERCENTAGE OF ATTENDANCE BY TYPES OF SCHOOLS

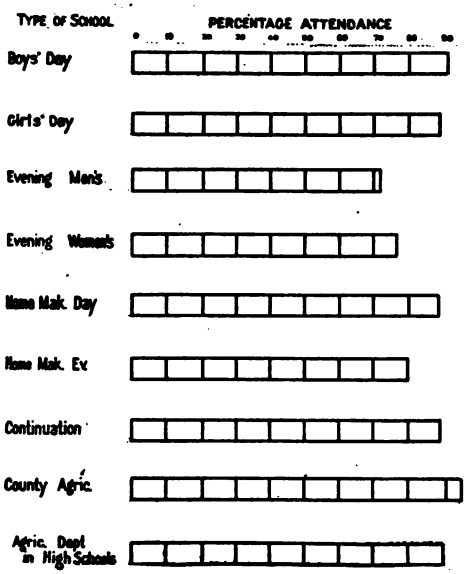



FIG. 12. — In spite of residence at home and the pressure of farm work at certain seasons, the attendance of agricultural pupils compares favorably with that of other pupils in vocational schools. Chart prepared for Panama Pacific Exposition.

Vocational agricultural education, in short, is one phase of effort to conserve the valuable years of youth for the best uses of both society and the individual.

There has been a general movement throughout the country for agricultural education of secondary grade. Even five years ago there probably were not fewer than five hundred secondary schools in which agriculture was seriously taught. More than five times that number now list agriculture among their courses. The training varies from the study of an agricultural textbook in the hands of the general teacher who does not bring to her task any special training, to the out-and-out vocational school which employs men who are specialists in agriculture. Various territorial and political units for

[1] Chapter 471 of the Acts of 1911, Section 1.

the development of agricultural schools of outstandingly vocational type have been adopted.

**A. Agricultural schools at colleges of agriculture.** — In some states a single school, located at the State Agricultural College, sufficed a number of years for the entire state. The first, and still perhaps the strongest, school of this kind was the School of Agriculture at St. Anthony Park, Minnesota. These schools have not been preparatory departments to the colleges so much as they have been special finishing schools for those who did not desire an agricultural college degree course, but desired the directest and most competent possible training for practical farming that could be had in a course of two to three, and, in some cases, four years, following such preliminary preparation as that afforded by the common schools of the rural districts.

PERCENTAGE OF WITHDRAWALS BASED ON TOTAL ENROLLMENT IN DIFFERENT SCHOOLS

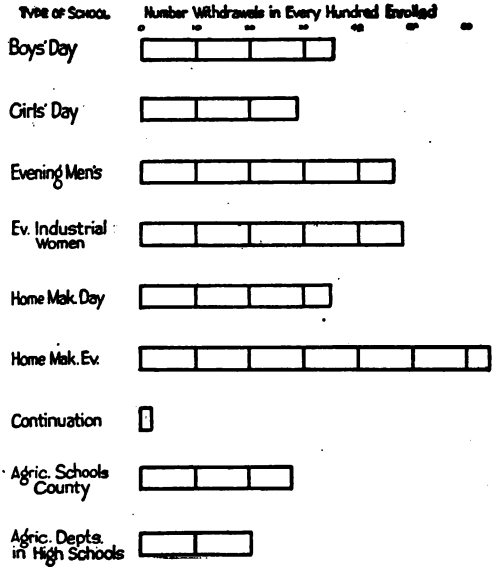



FIG. 13. — The percentage of withdrawals is strikingly favorable to agricultural pupils; and, it will be noticed, there are even fewer withdrawals from departments than from separate or county schools.

While the demands for vocational agricultural training were sufficiently limited so that a single school could do the work required, it was highly advantageous that the school should be located at the State Agricultural College. Duplication of expenditures for land, buildings, and equipment could thus be avoided. The students might be trained in part by assistants; but, first or last, became acquainted with, and felt at first hand the influence of, the best special-

ists in the state in agricultural research and education. The agricultural college teaching staffs generally were the staffs of the schools, and sometimes adapted their instruction to the needs of their school pupils, as distinguished from the needs of their students of college grade. Certainly schools so located have stood high in the estimation of the people. President Northrup once said that there were people in Minnesota — not a few — in whose minds the School of Agriculture stood for the whole University.

PERCENTAGE OF WITHDRAWALS PLACED IN INDUSTRY FOR WHICH THEY RECEIVED TRAINING

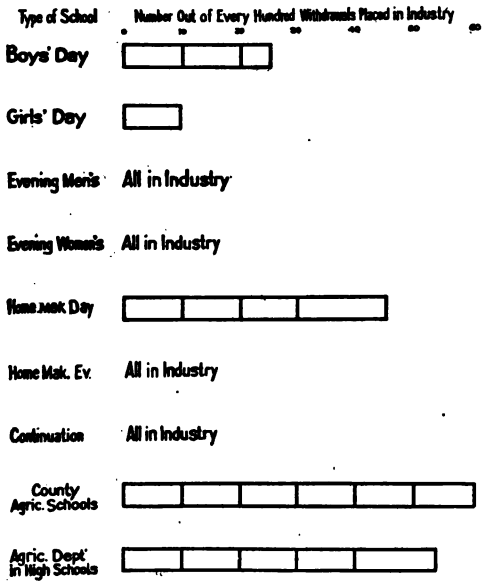



FIG. 14. — Again strikingly favorable to agricultural training is the percentage of withdrawals placed in the occupation for which education had been sought. Care in canvassing the aptitudes and aims of applicants is amply repaid. Perhaps greater care is possible in the cases of agricultural applicants than in the cases of other applicants, because of the requirement that facilities for home projects, or approved substitutes, must be provided for prior to admission.

**B. Separate agricultural schools.** — In certain states, New York and Massachusetts among the number, it has been considered inadvisable to maintain vocational agricultural schools on the premises of, and in immediate connection with, the State Colleges of Agriculture. In these cases the resources of the schools are more or less limited. The courses vary greatly in length and character. Some differ but slightly from the State Agricultural Colleges of earlier days. Others maintain two-year courses of six or eight months each, from which have been omitted such subjects as algebra, geometry, and all

instruction in languages except English. Some utilize a limited amount of land for demonstration purposes. Others provide for more or less practical farm work on the school farms. In fact, these schools have proved to be most interesting and valuable experiment stations in methods of vocational agricultural education. Perhaps it is not too much to say that out of the very " weakness " of some of these schools in land and equipment has come the best strength of the whole movement for a type of agricultural training which shall be genuinely vocational. That is to say, vocational efficiency at the end of the course of training appears to bear no directly proportionate relation to the comparative amounts of money invested in the school plants and in their cost of operation; and, similarly, it appears to depend more on points of view and on methods among the various staffs, than upon relative faculty numbers and salary budgets.

Among the most interesting, from a thoroughgoing vocational point of view, are the congressional district agricultural schools in Georgia. The place of these schools in the state system of education is clearly indicated by the following excerpt from one of the early general announcements.[1] " If the students wish a classical education or a purely literary education, they should go elsewhere. If they want a common school education, this is not the place for them. If a boy wants vocational training for a life on the farm, together with a good high school training in English, mathematics, history and the sciences, here is the school designed for him."

For girls in these schools there are provided " a good literary and scientific high school education, training in the domestic arts and sciences," also training for teaching.

The United States Bureau of Education[2] has classified these institutions as " special " schools. Thus it sharply distinguishes them as vocational, from other so-called agricultural schools which do not make definite provision for practice in farming operations, which do not require all students to spend at least one-fourth of the entire time on agriculture (or home economics in the case of girls), which are not

[1] Bulletin of Georgia State College of Agriculture, July, 1914, p. 16.
[2] Bulletin No. 513, p. 14.

distinctively of secondary grade and which, in some cases, require students to take higher mathematics and foreign languages.

From evidence of visitors and reports of work done, it appears that these schools in Georgia are not college preparatory schools in any ordinary sense of the term, and that they will well warrant the high hopes inspired by their practical plans. With adequate laboratory

FIG. 15. — Some schools have land and tools for tillage. Note three kinds of harrows, manure spreader, and sulky plow. Smith's Agricultural School, Northampton.

facilities, at first lacking, and with proper correlation of classroom and farm instruction, they should afford vocational agricultural education of a very high order.

**C. Agricultural departments in high schools.** — Since the origination of the "Home Project" plan in Massachusetts, and its early adoption in somewhat modified forms in New York, Pennsylvania, and Indiana, vocational agricultural departments in high schools have been more and more widely provided for throughout the country. Following are some of the considerations favorable to such departments.

**a. Fifty departments for the cost of ten schools.** — The cost of establishing a vocational agricultural department in a regular high school is comparatively slight, — not a tithe of the cost of construct-

ing and equipping an independent agricultural school. Fully fifty departments can be maintained for what it would cost to maintain five large, well-equipped, and effective agricultural schools. The provision of agricultural departments strongly commends itself, therefore, on the grounds of economy.

**b. Departments should reach the greatest number.** — An agri-

FIG. 16. — "Related study" recitation and demonstration room. Seats 108. Mothers' meetings held here. Seats comfortable for men and women. Note folding tablet arms. Few mixed classes. As a rule, separate classes for home-making and agriculture. Here a discussion of common interest. Smith School, Northampton.

cultural department close at hand, which permits the boy to live at home and help with the farm work morning and night and on Saturdays, appeals to parents in modest circumstances. Practically all parents, however well-to-do or however needy they may be, are rightly reluctant to have their children leave home at fourteen, or even at sixteen or seventeen years of age.

Many agricultural departments widely distributed through a state should induce the attendance of the largest number of pupils, and thus provide a system of agricultural education suited to the needs of the greatest number of farm homes.

**c. An elastic service system.** — If the tide of interest turns strongly towards non-agricultural courses and careers, or if for any other social,

psychological, or practical reason the number, for the moment, who desire agricultural training becomes too small to warrant maintenance of a specialist in agriculture, the instructor, together with state and federal aid, may be transferred elsewhere. Meantime, there is little or no expensive equipment to lie idle or to deteriorate. The service can be renewed when interest and numbers justify it.

**d. Departments demonstrate.** — Surrounded by farms, vocational agricultural departments in high schools at once enlist the motor

FIG. 17. — Bit of drill in exact observation, use of metric system, etc. Good type of laboratory table for agricultural physics. Substantial and steady. Acid-proof top. Gas and water on benches along two sides of room. Concrete floor. High basement. Abundant window space and excellent light. Smith School, Northampton.

instincts and activities of the boys from these farms in carrying out simultaneously with their school instruction and as vital parts of it, practical farming projects on their own premises.

The best methods are told and shown. And most boys, as well as most men, in agriculture as in all other productive pursuits, make their best progress by being told and shown, man to man, what to do, and why and when and how to do it.

**e. Open doors of opportunity.** — Mr. D. J. Crosby, when specialist in agricultural education of the Office of Experiment Stations, Washington, D. C., said that he hoped to see secondary agricultural education throughout the country "Open at both ends, — open at the

beginning, so that the farm boy could enter; and open at the end, so that those farm boys who desired to go on to higher agricultural training should be able to do so."

Agricultural departments may admit any farm boy who has reached his fourteenth birthday, without regard to whether or not he can pass entrance examinations for admission to high school, provided he can demonstrate his ability to profit from the agricultural instruction offered. This opens the door to the boy who may not be " bookish," but who may be capable of making excellent progress in applied science as worked out by the home project method.

Fuller opportunity, at the same time, may be afforded the boy who is both " bookish " and " practical," to advance in both agricultural

FIG. 18. — Household and stable hygiene and sanitation laboratory. Balances. Microscopes. Sinks. Gas and water connections. Babcock tester. Steam sterilizer. Ovens. Beakers. Filters. Smith School, Northampton.

and academic training. If a boy training for farming valued graduation from a strongly cultural course, one that perhaps even included Latin or Greek, and if he were able to cover the ground required for such graduation without detriment to the vocational training in his agricultural course, he, too, should find wide open before him a door of opportunity commensurate with his ambition and his natural powers.

More and more, agricultural science is bound to be recognized in units of credit for meeting college entrance requirements; certainly, for meeting the requirements for admission to colleges of agriculture.

It must be evident, in short, that agricultural departments in high schools throw open to boys from the farms not limited opportunities only, but opportunities for the most advanced agricultural education of which they may be capable and to which they may aspire. The fact that firm footing for their feet is found at the outset through the immediate application of their science instruction in their home farm projects should certainly be no detriment.

**f. Avoidance of undue delay.** — The establishment of agricultural departments in existing high schools cannot be accomplished overnight. Their success depends upon picked men for teachers; and

FIG. 19. — Farm and home chemistry studies that never will be forgotten. Earthenware sinks, with straight lead-pipes emptying into graded gutters in concrete floor. Only one trap — that at connection of graded gutters with sewer. Pine-top benches, with black, acid-proof finish. Half-inch, rounded bead at edges and ends of benches to keep glass-ware from rolling off. Smith School, Northampton.

the selection of such men, or their training, requires time and attention. Some time is required, also, to enable the local committee in consultation with the state authorities to outline the course of training best suited to meet the needs of the farm boys in any given locality. Certain special agricultural classroom facilities and equipment require some time for preparation.

But the time necessary for the establishment of such departments is comparatively brief. In one, two, or three years it should be possible

in any agricultural state to have a reasonable number of such departments actively at work, and reaching most of the farm boys in that state who need this form of agricultural education.

**g. High school strengthened.** — Such departments strongly commend themselves in localities where farm labor is short, and where school consolidation and the development of strong local high schools are in progress. That they can be made to give vocational agricultural education, real and highly efficient, it is part of the purpose of this book to show.

**(2) A square deal in vocational education. A. General schooling not enough.** — Even in Massachusetts, where the school-going habit

FIG. 20. — Farm shop work. Wagon repairing, saw filing and other tool sharpening, thread cutting and pipe fitting, drilling, soldering, harness mending and rope splicing. Partitions and part of upper floor of old house taken out and shop fitted up by pupils. Replaced later by model shop, including drawing room and room for painting and varnishing, in new building 40′ × 80′. Smith School, Northampton.

has been developed among the people at large to at least as favorable proportions as in most parts of the world, school instruction has had almost no direct bearing on the probable life work of a great number of boys and girls; and until recently it has yielded practically no knowledge or skill to those boys whose severest need is education for efficiency in the work and affairs of modern farming.

**B. Books and bulletins not enough.** — How many of the rank and file of busy farmers have had the time, the opportunity, or the inclina-

tion to learn even the alphabet of agricultural science, — that difficult alphabet, in which the most valuable bulletins and treatises on modern agriculture are written? The higher the aspirations of the men of agricultural knowledge, and the more commendable their accomplishments in the conquest of agricultural science, the more difficult of comprehension do their published works become in the hands of the man hard pressed by the daily affairs of farming.

The need of the hour is the need of the teacher who can simplify language, and help the boys who are to be farmers in a given town or district to understand the practical bearings of the best research in agriculture on their problems; and who can show the boys, on their own farms and in laboratory and other demonstrations, the best methods which are applicable to local conditions.

**C. The farm not enough.** — It has been said that "The worst thing about farming in New England is that almost any kind of farmer can get a living on almost any kind of farm." Productive farming, in New England or, anywhere else, properly speaking, is not eking out from the land the nakedest necessities of life. Productive farming, moreover, is farming for the community, not merely for the individual; it is economic farming, and as such contemplates profit in proportion to the service it renders the community, — in proportion to the quantity and the quality of the commodities put upon the market. Such farming demands the highest operative skill, the keenest scientific insight, and the broadest outlook over the wants and the welfare of the community. Many men on farms to-day are doing exactly this kind of productive farming. They have built up their ability through hard years of experience. They would be good schoolmasters for their sons in this skilful work, this scientific insight, and this breadth of outlook.

But, just as the lawyer who must practice law is generally unwilling to teach it, so the productive farmer, who must meet the pressing demands of economic agricultural operations, and who in most cases must be at once the skilled operative, the scientific observer, and the capable business manager, cannot stop to teach his boy the many things he ought to be taught in the years following his fourteenth birthday. If this is true of the farmer of exceptional ability, it is

even more evident among farmers in general. Each, in any event, would be without certain laboratory facilities necessary to a proper study and comprehension of the chemical, physical, and biological facts and principles which underlie the best farm practice.

**D. Conclusion.** — That there is a decided lack of, and demand for, agricultural training of a scientific and very practical character, suited to the needs of boys, and of some girls, over fourteen years of age, who

FIG. 21. — Forge shop. Note portable forges such as some of farm boys have at home. One blacksmith's forge, with electric blower. Wagon ironing, drill sharpening, chain repairing, etc., taught agricultural course boys. Smith School, Northampton.

expect to live on, and gain their livelihood from, farms, there can be no doubt. The need is but the more accentuated by the growing industrial and commercial schools open to boys and girls fourteen years of age and older, which, with their novelty and attractive equipment, tend to lure away from the land and into congested centers, in the absence of attractive and competent agricultural education, many young people whose natural tastes and aptitudes would make them, if properly trained, better, happier, and more prosperous citizens in the open country.

## CHAPTER II

### HOME-PROJECT SCHOOL OR DEPARTMENT *VERSUS* SELF-CONTAINED SCHOOL

PRODUCTIVE work of a high order of efficiency is coming to be considered a vital test of all systems of vocational education of secondary grade. Moreover, in vocational agricultural education, it is coming to be accepted that the training must be such as to develop both skill and managerial ability. The competent farmer must be not only expert in the varied technique of his calling, but also a sound and progressive business manager.

#### 1. Spectator versus Participant

Neither skill nor business ability can be learned from books alone, nor merely from observation of the work and management of others. Both require active participation, during the learning period, in productive farming operations of real economic or commercial importance.

In general, if there is a defect in the large agricultural schools, which boys must leave home in large numbers to attend, and which, in order to secure attendance adequate to justify their cost, must apparently limit their training to six or eight fall and winter months, it is the defect of putting too great reliance upon books and observation, to the exclusion during the intensive learning periods of active participation in the type or types of productive farming the boys intend to follow after graduation. Too great, in the cases of many of the boys fatal, reliance is put on the ability of the pupils once well grounded in sound theory at the school to put that theory into successful practice on their own farms, alone and unaided.

Even if the large school undertook to put its plant and equipment to the strictest productive farming uses of a profitable commercial character, and to induct its pupils into its aims and to school them in

its methods, its efforts would be more than likely to break down through sheer weight of numbers. The fifty-man farm is rare, the fifty-boy school is not.

School farms at present can hardly claim to be thoroughgoing commercial farming concerns. The most flattering school photographs, where the aims of the school are most emphatically practical, show by far too few participants and by far too many spectators. To see a thing done, however good the demonstration, is not to do it oneself. To participate in carrying out an enterprise planned and ordered

FIG. 22. — Boys taught how to make concrete floors, walks, posts, mangers, etc. Real jobs, not mere exercises, for group, no less than for individual, instruction. Permanent improvements, needed by a school or elsewhere in the neighborhood, provide such jobs. Smith School, Northampton.

by another — by even an agricultural instructor — may leave one little better than a gang laborer. The pittance paid per hour, where any pay at all is given, can hardly be considered comparable, as an incentive to keen interest and alert action, to the reward the pupil might hope to realize from an independent enterprise planned and executed by himself and wholly for his own profit or that of his family.

It must be feared that however excellent may be its work in selected demonstrations and other operations, school farming, from a strictly commercial point of view, must always remain more or less artificial. Perhaps the best use to which an agricultural school, large or small,

can put its own land and equipment is that of illustrative operations. Some schools, notably the Northwest School of Agriculture and Branch Experiment Station, Crookston, Minnesota, have adopted this view. It is not clear, however, that any considerable number have adopted

FIG. 23. — Boys plan in advance their farm repair and construction work. Note drawing benches. Home made, cheap, light, rigid. Good drawing boards and instruments. Smith School, Northampton.

methods of training calculated to overcome the defects of dormitory, or self-contained, institutions as agencies for graduating young men well proved in the practice, as well as in the theory, of productive farming.

Most of the schools are far from confining their activities to their own premises and regular school classes. What may be done supplementary to the usual school work was early and admirably set forth by Messrs. D. J. Crosby and B. H. Crockeron in Separate No. 527 from the Year Book of the United States Department of Agriculture for 1910, under the title " Community Work in Rural High Schools." But community work, as such, is directly planned for those, principally adults, who are not in school.

### 2. The Fundamental Problem

The problem, then, of providing for actual participation, both as manager, on at least a moderate scale, and as worker, in productive farming, simultaneously with his classroom instruction, by the boy in the vocational agricultural school or department, may fairly be looked upon as of fundamental importance. How shall it be solved?

Agricultural schools prior to 1908, like agricultural colleges, had been self-contained. The instructors had no first-hand knowledge of the home-farm conditions of those admitted to their classes. They

FIG. 24. — Agricultural school should have home-making department. Real jobs needed as basis of instruction for girls as well as for boys. Providing school luncheon, substantial, tempting, cheap, is such a job. Photograph shows lunchroom where noon meal is provided daily at cost. Dishwashing and scrubbing paid for by the hour. Other service part of class work. Lunchroom self-supporting. Smith School, Northampton.

taught, marked, and graduated. All conditions for graduation were met on their own premises. There was no follow-up system after graduation by which individual pupils were assisted in applying their training in productive farming. There might be some sort of placement office through which jobs might be secured and in which records of success might be kept. But, for the rest, as a rule, as with law school and most other professional school graduates, winning success was a sheer process of individual struggle and survival of the fit.

The author had served such an institution for eleven years; and,

more and more, had become convinced that a radically different system was more to be desired for boys of high school age, and could be developed. When appointed director of the first vocational agricultural school in Massachusetts, he undertook to develop at a school which had land, live-stock, and farming equipment, a plan of teaching agriculture which would be efficient at a school which had neither land nor live-stock. There was to be no dormitory, and there never

FIG. 25. — Here and in model home kitchen adjacent, school lunches are prepared, and principles and methods of cooking, canning, drying, and dietaries are taught. Left folding doors lead to model dining-room, those at right lead to room used part of year for model chamber. Smith School, Northampton.

since has been a dormitory in the Massachusetts state-aided system. The home farms of boys living at home, and farms on which other boys were found employment in the vicinity of the school, were to be utilized for productive farm work by the boys admitted to the school; and such farms have continued to be the principal reliance for such work in the Massachusetts system. To accentuate such reliance, the trustees of the school authorized the sale of the school herd of cows, in order that from the first moment to the last of their agricultural school training the boys and their instructors should study,

and pit their powers against, the real problems found on the privately owned property of dairy farmers.

The plan of this first school, the Smith's Agricultural School at Northampton, was published in 1908 in its first booklet as follows: "Preparation for certain kinds of work will be the primary aim of this new school. It will provide training in agriculture with a view

FIG. 26. — Model dining-room. Table service is taught. Each girl serves in turn as cook, maid, hostess, host, and guest. Walls have since been tinted, and rugs woven for floor, by girls in household art classes. Smith School, Northampton.

to practical and profitable farming. . . . Every effort will be made to relate the training of the school intimately and at once to practical affairs off the school premises. . . . Pupils preparing for farming will best serve their own ends and the ends of the school by living at home. While the freshman is studying the elements of soils and plant life, he will have plots of ground at home, preferably parts of the

kitchen and flower gardens, where he will apply the . . . methods" taught by the school "on soil he may some day own. There his methods may be compared with his father's, and those of his neighbors. He will be keen to learn from them, perhaps his people may now and then learn something from him. In the sophomore year there will be like training in handling the smaller animals of the farm, the sheep, or swine, or poultry, or bees; in the junior year, in connection with fruit growing and market gardening; and in the senior year, in handling the larger farm animals, including dairy cattle. Every farm represented by a pupil will thus become an essential part of the working outfit of the school. There will be no sundering of the ties of home when school ties are formed; on the contrary, a good home farm should become dearer to the boy's heart, more enjoyable and more profitable every day. Each farm will contribute of its best to the training of the school; it is hoped that the school will prove to be a help to every farm from which a pupil is sent." The boys were supervised throughout the producing season by members of the school staff who called at their homes.

Thus began what has been known, since the report of the Massachusetts Board of Education on "Agricultural Education" published in 1911, in which the present state-aided system was proposed and which the author assisted in preparing, as the "Home-Project" plan. In this plan has been found a satisfactory solution of the fundamental problem stated in the first paragraph of this section — the problem of providing, every year, in every agricultural school and department, in the case of every pupil, for participation in productive farm work done in connection with study directly related thereto.

### 3. Productive Farming as Educational Projects

Farming is favorable to the home-project plan, because it resolves itself readily into various more or less independent units of productive work. Units of agricultural experiment station work, under the "Adams Act," which provided federal aid for such work in all states, had been called "projects." Constructing a bridge had been called a "project." There had been all sorts of business undertakings

called " projects." "Project" was a convenient, almost self-explanatory term for units of farm production.

(1) **First use of " project " for unit of vocational instruction.** — We do not remember who first used the term " project " as applied to units of farm production studied at the school and carried out by the boys at their homes under school supervision such as that proposed in the foregoing announcement. Dr. David Snedden became

FIG. 27. — Home nursing — changing a bed with patient in it. A strong course in home nursing and emergencies is given. Model chamber for the sick. Smith School, Northampton.

Commissioner of Education in Massachusetts, November 15, 1909; and Mr. C. A. Prosser, Deputy Commissioner for Vocational Education in January, 1910. Dr. Snedden remembers using the term " project " in a committee discussion of the National Education Association, in 1908–1909, in connection with manual training proposals; thinks he " insensibly carried the word over to discussion of a voca-

tional school unit of work;" and in a letter dated April 15, 1918, wrote to the author: "I am quite sure that the use of the words 'project' and 'home project' both began in the early days of the work of yourself, Mr. Prosser, and myself in Massachusetts." Certain it is, also, that the home-project plan benefited from the close collaboration and stout support of both Mr. Prosser and Dr. Snedden, in the earlier days; and has benefited since, particularly in administrative matters, from the strong and consistent support of Deputy Commissioner R. O. Small and Commissioner Payson Smith, by whom Mr. Prosser and Dr. Snedden were succeeded.

**(2) "Project" defined and described. A. A farming project is a thing to be done. a. Improvement projects.** — The thing done may

FIG. 28. — Dressmaking and millinery room. Course from plainer under-garments and work dresses to dainty wear, evening gowns, and opera capes. Girls taught to make and remodel their own hats. Garments and fancy articles made for sale. Smith School, Northampton.

contribute some element of improvement about the farm, as constructing a concrete walk leading to the front door, the planting and nurturing of shade trees, the making and maintaining of an attractive lawn.

**b. Trial projects.** — The thing done may be the planting of an untried variety of fruit, the feeding of an untried ration, the testing of an untried spraying mixture, or the testing of one or another of much advertised roofing materials.

**c. Productive projects.** — Finally, the thing done may be of a productive nature, as the growing of a crop of clover or alfalfa, the growing of a field of potatoes, the growing of a crop of silage corn, or the production of eggs for the market.

**B. A farming project is, further, something to be done on a farm, which involves a limited and definite amount of equipment, materials, and time, and which is directed toward the accomplishment of a specified and valuable result. a. Improvement.** — An improvement project may be limited, for example, to a given length and width of concrete

FIG. 29. — Grand Army veteran addressing School at Memorial Day exercises. Desks on cleats and movable. Floor cleared when required for social or community center events, or for exhibitions and sales. Flat-top desk with tier of drawers and one center drawer, better than the largest school desk here shown, and equally movable. Smith School, Northampton.

walk, constructed of a given kind of stone, sand, and cement, costing not to exceed a given sum of money, and requiring not to exceed a specified amount of time.

**b. Trial.** — A trial project may be limited, for example, to the planting of a given number of trees of an untried fruit, on a piece of ground which could well be spared for such a hazard, and involving a cost in time and money which it was felt could be afforded at a given time for this risk.

c. **Productive.** — A productive project may be limited, for example, to the growing of a given area of clover or alfalfa, at a given cost for seed, fertilizer, and labor, and for the securing of a specified quantity and value of feeding stuff or roughage.

**C. Finally, a farming project, as the term is here used, is a thing to be done on a farm, which, preparing to do it and carrying it out to a successful result, involves a thoroughgoing educational process.**

a. **Improvement.** — The improvement project of constructing a concrete walk to the front door should include such study as the nature

FIG. 30. — Assembly Room cleared of desks. This school has a department for carpentry and inside finishing. At left exhibition and sale of cabinet work. At end a candy booth and sale. All articles made by pupils. Room has a portable stage for dramatics. Floor used for dancing. Smith School, Northampton.

of cement; its action on sand and gravel or broken stone; its resistant qualities to the weather; the seasons at which it could be used; its cost, as compared with other materials, such as boards, plank, tar, brick, flagging, and asphalt; the mathematical determination of the proportions of cement, sand, and stone to be used; the geometrical determination of the sections into which it should be divided, and whether it should be crowned or flat; the geographical sources of the raw material; and the market conditions for purchasing cement.

b. **Trial.** — The trial project of planting an untried variety of fruit should include such study as the probable adaptability of the

variety selected to the soil, the climate and the market demands within reach of the farm.

c. **Productive.** — The productive project of growing a crop of clover or alfalfa should include study of the various varieties of clover; the comparative adaptability of these varieties to the given field on which the crop was to be grown and to the climate of the locality; the purity and percentage of germination, and the most reliable places for the purchase of seed; the best time for seeding; the best time for

FIG. 31. — Plants and fancy articles produced by girls. Exhibition and sale. Assembly Room. Smith School, Northampton.

cutting; the best methods of curing and storing; the mathematical calculation as to the saving in cost of feeding stuffs which the crop would afford; the chemical elements it would furnish in the ration; and the chemical, biological, and mechanical effects on the soil in which it would be grown.

**D. A complete definition of a "project" as here used has three elements.** — Thus, it will be seen that a complete definition of a farming project as here used involves the three elements of something to

be done: a., on a farm, b., under specified conditions and for a specified valuable result, and, c., requiring a thoroughgoing education.

**E. Project fields or classes.** — There are certain broad, general fields in which numerous projects are found. Among these are:

| | |
|---|---|
| Vegetable gardening | Growing of greenhouse crops |
| Flower gardening | Production of poultry products |
| Landscape gardening | Beekeeping |
| Orcharding | Swine husbandry |
| Small fruit growing | Sheep raising |
| Growing of general farm crops | Horse raising |
| Farm forestry work | Dairying |

Agricultural physics and mechanics as applied in farm building, draining, irrigating, and providing and maintaining farm machinery.

(3) **Educational analysis of a project.** — That productive farming projects may be given strong educational value may be indicated by analysis of a cash crop project suitable for the third or fourth year, namely growing a crop of potatoes. It is true that potato growing has been successfully done by elementary school pupils; but even a glance over the factors which enter into the project now to be outlined will show that problems altogether too serious to be comprehended or undertaken by the younger pupil are here involved.

It is to be understood, of course, that the following project is but one of many which might be selected.

It is assumed that the boy has chosen for his major project the development of a plan to increase the profit from the potato crop customarily grown on the home farm. It is further assumed that 5 acres of potatoes are generally grown; that this year the crop is to be grown on clover sod; that the variety of potatoes to be grown has been chosen by the father; and that the boy's father is willing that his boy shall have complete control of a given number of rows of the 5-acre field, and shall be furnished the necessary tools and materials for his project.

Sub-projects necessary for carrying out the above major project might then be as follows:

**A. Insuring the most abundant crop by:**

**a. A proper seed bed.** — The related study here should include knowledge of:

(a) Conditions of soil air, texture, temperature, and moisture most favorable to the growth of the potato plant, including methods of reducing an undesirable amount of " free " water, of avoiding too great dilution of plant food, and of securing a desirable amount of other water.

(b) Methods of preparing the seed bed, including the comparative advantages of fall and spring plowing, and the best treatment of the land in the spring after plowing and prior to planting.

FIG. 32. — Assembly Room. Sewing and dressmaking exhibit. Work of girls. Smith School, Northampton.

**b. Proper fertilizing.** — The related study here should include knowledge of:

(a) Chemical composition of the potato plant, its osmotic and digestive processes, and the quantity of available fertilizing materials it is capable of assimilating.

(b) Complete fertilizers for the production of potatoes, including analyses of standard fertilizers, and the plant-food values for potato growing of chemicals and mixtures offered for purchase.

(c) Comparative desirability of muriate and sulphate of potash for producing a crop to be disposed of in an immature state as new potatoes, or for producing a crop of late potatoes to be disposed of for winter use; and the extent to which the " mealy " character of the mature crop should be the determining factor in choosing between these two kinds of potash.

(d) Clover sod as a factor in determining the proportion of nitrogen to be supplied.

(e) Best formula for a complete fertilizer for this particular crop, taking into account the potato plant, the previous crops and their fertilizer treat-

ment in the system of crop rotation followed on the home farm, the present soil conditions, and the purpose of the crop.

(f) Most liberal amount of fertilizer warranted for use in growing this particular crop, in view of the known condition of the land and the assimilative powers of the potato plant; and the saving in cost by home mixing of the supply to be used.

**c. Using the best seed.**—The related study here should include knowledge of:

(a) Botanical characteristics of the potato plant; the difference between a seed and a tuber; and potato improvement by various methods and conditions of propagation, taking into account tendencies of the potato plant to "variation" and to "mixing in the hill."

(b) Importance of planting "seed" selected in the field from the best-yielding hills, rather than seed selected from the bin merely by size of tubers;

FIG. 33.—Vista with mansion at end on property selected for Essex County Agricultural School. Real home for the Home-making Department ready for work with minimum of delay. Similar buildings found on properties approved for Bristol and Norfolk Agricultural schools.

checked by the importance of using potatoes produced under cooler climatic conditions than those under which the pupil's crop is to be grown.

(c) Advantage of using potatoes for planting which have been properly stored, and the effects of freezing and of sprouting in the cellar.

(d) Conditions under which it may be desirable to sprout potatoes to be used for planting, in a warm, well-lighted room, — the temperature, the time, and the care in handling required for such sprouting.

(e) Size of piece and number of eyes to the piece, as important factors in starting the crop and in the quantity of its yield.

**d. Proper planting.** — The related study here should include knowledge of:

(a) Botanical and chemical characteristics of the potato plant, as to its feeding habits, the growth of the tubers, and the effect on the tubers as food products of exposure to the sun during their growth.

(b) Distances between rows, and between seed pieces in the row.

(c) Depth of planting, in its relation to protection of the tubers from the sun, shielding the crop from possible rot-producing bacteria and spores, and subsequent cultivation, whether by the " level " or by the " hill " method.

(d) Best time for planting, whether for " early " or for " late " potatoes.

FIG. 34. — Horse stable and carriage house found on property selected for Essex County Agricultural School. Ample barn space elsewhere. Quickly converted into school building for the Agricultural Department with 130 boys. See Fig. 35.

**e. Proper spraying.** — The related study here should include knowledge of:

(a) Botanical characteristics of the potato plant, particularly the relation of health and luxuriance of foliage to tuber production.

(b) Insect enemies of the potato plant, and their entomological characteristics, such as their methods of propagation and their feeding habits.

(c) Depredations of insects, and their possible relation to attacks upon the potato plant by plant diseases.

(d) Paris green: its chemical composition; its protective action against the insect enemies of the potato plant; dangers attendant upon its use; its possible combination with Bordeaux mixture; and the best formula, method of preparation, and periods for its application. Arsenate of lead similarly studied.

**f. Proper cultivating.** — The related study here should include knowledge of:

(a) Physical characteristics of the soil, particularly the capillary movement of water to the surface of the soil, and exhaustion of soil moisture by evaporation.

(b) Surface conditions most favorable for receiving rain water without washing, puddling, or subsequent baking.

FIG. 35. — Barn, shown in Fig. 34, remodeled at moderate cost into school building. Part of faculty shown. Steel lockers, shower baths, and lunchroom in basement. Essex County Agricultural School.

(c) Value of a " dust mulch," and the most desirable method and frequency of cultivation for maintaining such a mulch.

(d) Comparative cost and advantages of " level " and " hill " cultivation, and reasons for the choice of the particular method to be followed in cultivating the present crop.

**B. Insuring the cleanest crop by:**

**a. Dipping the " seed " potatoes** in a formalin solution. The related study here should include knowledge of:

(a) Plant parasites which produce " scabby " potatoes, and the biological conditions favorable and antagonistic to their growth.

(b) Formalin solution: its chemical constitution; its chemical action on these damaging potato parasites; and the proper formula and method for its use in protecting the potato crop.

**b. Substituting chemical fertilizers** for barnyard manure. The related study here should include knowledge of:

(a) Dangers of infection from the use of barnyard manure.

(b) Dangers of infection, if any, from the use of chemical fertilizers.

**C. Insuring the soundest crop by spraying** the potato plants with Bordeaux mixture. The related study here should include knowledge of:

**a.** Bacterial and fungous diseases to which the potato plant is subject; evidences of their presence; and whether or not they are preventable.

**b.** Bordeaux mixture: its chemical composition; its protective action against potato-plant diseases; and the best formula, method of preparation, and periods of application for its effective use.

FIG. 36. — New classroom, laboratory, and office building now completed to accommodate 200 boys. Very compact county. Network of steam and electric railways. Large enrollment at central school less objectionable under such conditions. No dormitory here or anywhere in the Massachusetts agricultural school system. Boys in foreground studying vegetable seeds they are producing. Essex County Agricultural School.

**D. Other sub-projects** should include the most profitable means and methods of harvesting, storing, and marketing the crop. And other study related to these projects should include knowledge of potato implements and machines and their uses; the comparative advantages of cellar and field pit for storage; principles and means of ventilation, and the temperature at which potatoes should be kept; near and more distant markets, and comparative transportation cost; prices and the probable tendency of prices, in view of the press and government reports of the potato crop for the state, neighboring states, the country, and the world.

The study related to the work of carrying out this potato project embraces, therefore, important matter from several sciences, including botany, chemistry, physics, entomology, bacteriology, and plant pathology. For the calculations, mathematics would be necessary; for keeping the accounts, bookkeeping would be required; for correct

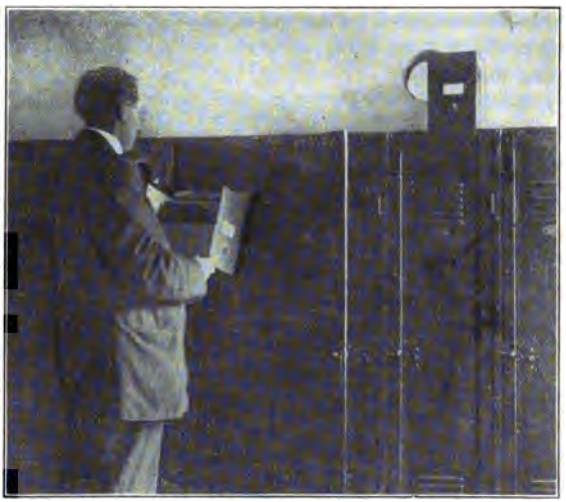


FIG. 37. — Steel lockers, length here shown, ventilated and with shelf in top, preferred. Note dust-proof filing case, open in Director Smith's hands, and closed on top of locker, used by pupils for notebooks, textbooks and bulletins between classes. Essex County Agricultural School.

correspondence, there should be training in business English; consideration of transportation, markets, and world production would involve knowledge of commercial and agricultural geography.

The project method of instruction on the side of related study, thus, it will be evident, must insure that the boy, in carrying out his projects, shall pass through a thoroughgoing educational process.

### 4. Projects of Pupils, and Other Farm Work

The home-project method of instruction fits nicely into the usual farm activities of the boy. The boy may help with the milking throughout his course, where the object is to get the cows milked as

quickly as possible and where no records are kept. During certain months of at least one year, the school should require whatever time may be necessary to keep an accurate record of a part of the herd. This may be limited to the weighing and Babcock testing of milk from a single cow and giving the cow credit for what she produces.

It may be part of the boy's business to assist in feeding the cows. During part of his course, sufficient time should be given him to weigh the ration and to charge at least one cow what it costs to keep her.

In the original routine to which he has been accustomed in milking, much or little attention may have been paid to the cleanliness of cows,

FIG. 38. — One of Agricultural Science laboratories in remodeled barn. Pupils testing soils. Part of "project study." (A barn at Bristol County Agricultural School was similarly adapted to immediate classroom use while new main building was being provided, and is now used for farm shop-work and apple packing.) Essex County Agricultural School.

utensils, or the person and clothing of the milker. During part of his time in school, the boy should be given whatever time may be necessary to milk at least one cow and preserve her milk under absolutely sanitary conditions, and to sample the milk for bacteriological tests at the school.

In the original cropping of the farm, much or little attention may have been paid to leguminous crops. During one season at least,

facilities should be given the pupil to grow a field of clover, and to observe the effect of introducing a large proportion of clover into the ration of the cow.

In the ordinary conduct of the farm much or little attention may have been paid to the selection and testing of corn for seed. But, prior to planting, one season at least, the boy should be given whatever time may be necessary to make germination tests of the corn

FIG. 39. — Boys at luncheon in basement recreation room of barn remodeled into school building. Once the pig-pen. Now spotless with concrete floor and white enamel paint. Essex County Agricultural School.

which it is proposed to plant; also during one season the boy should be given control of a portion of the cornfield to make an "ear to row" corn test, to observe the difference in yield between different ears of corn, — all the corn from one ear being planted in one row, and all the corn from another ear being planted in another row.

In the ordinary routine of the farm it may be that the boy is required to tend the poultry. During at least one year, he should be given control of at least one pen of poultry, and facilities for feeding

a balanced ration and trap-nesting individual birds for comparison of productivity in laying.

It may be part of the usual work of the boy to help cultivate and harvest the potato crop. During one season at least, he should be given facilities for testing the value of the use of formalin for the prevention of potato scab, and of the Bordeaux mixture for protection against potato blight.

It may be part of the usual work of the boy to assist in the apple harvest. During one season at least, he should be given facilities for pruning at least one tree, spraying it, in winter, if it is at all infested by scale, and at other seasons for protection of foliage and fruit, cultivating under it and fertilizing it. During one season, also, he should be given facilities for grading and packing the fruit from at least one tree and for disposing of the product with a view to securing fancy prices for at least part of the crop. If he could be given control of a block of five or more trees, and were a fairly husky boy of sixteen or seventeen, the rewards for his work and incentives to intelligent action would be so much the greater.

### 5. Parents Like Home Projects

Parents like the home-project plan. It obviates the necessity of sending the boys away from home in order to secure the benefits of agricultural training. The cost of living for the boys is less at home than it would be at a boarding school. Parents who need the help of their boys are deprived of their services during only a portion of the day.

Coöperative work between the school and the home farm is an effective means of trying out under the conditions of individual farms, over widely scattered areas, methods which have proved to be profitable elsewhere, as, for example, at the State Agricultural College or Experiment Station. Such coöperation enables a boy to try out the home farm as an agency for producing profits, when treated by the best known methods; that is to say, the home project is a means whereby the principles and methods taught by the school can be positively, and without delay, adapted by the boy to the economic conditions of the farm on which he may spend his working days.

Home-project work thus gives to agricultural teaching the reality of actual life, as but little school training can give it.

Under the home-project plan, the instruction is adapted to the kinds of farming prevalent in the districts surrounding the centers where the work is established. The practical applications of the instruction are thus subject to the obstacles continually encountered under the economic farming conditions found in any given district, just as they

FIG. 40. — One of "project study" rooms in remodeled barn. Partitions and ceiling sheathed. Before new building was ready. Essex County Agricultural School.

are also aided by all the influences in a commonwealth which make for the improvement of farming.

The force of all this is felt by the parents. This struggle with realities, especially, wins their admiration and holds their respect. They feel that the agricultural instructors are competent and unafraid.

### 6. Young People Respond

This method immediately appeals to the motor instincts and activities of boys of secondary school age. The success of boys in the corn growing and other clubs in many states shows that boys instantly respond to help, though ever so little, at home.

A schoolboy of sixteen at a Massachusetts Corn Show won the sweepstakes against all comers, including the man who was the sweep-

stakes winner of the previous year at the big New England Corn Show, for the best single ear of corn and also for the best collection of ten ears. He had been given seed by the former winner, and had been told and shown out of school hours what to do, and when and how to

FIG. 41. — Electric cars pass the door. Service frequent. Half-rate fares to and from all parts of county. Special cars sent for pupils at close of school, and for such events as "Farmers Day," when fully 1000 people come to the school. Essex County Agricultural School.

do it on his father's land. The man who helped him said, " That boy has pumped me all summer ! " Most boys, like most men, learn best by being told and shown on the field of action. It is a new and most delightful experience in teaching when the boys, and not the instructor, do most of the pumping.

### 7. Counting the Cost of Farming

An essential feature of the home-project plan of training is the consideration of cost at all points. The boy by this method learns through his own experience that there can be no product without cost and no profit without excess of receipts over all expenditures. After such an experience, he will not be likely to undertake a new enterprise

without a serious attempt to estimate accurately his probable profit. The boy is subjected to the prevailing economic conditions under which the home farm must yield a profit or loss at the end of a year of work. The methods by which the boy becomes on a small scale a

FIG. 42. — Petersham High School, first to provide special equipment for agricultural course. One of first consolidated rural schools. On a hill-top. Nearest railways, steam or electric, about ten miles distant. All grades. Latest development, a model dental clinic. Built by taxation and subscriptions from public-spirited citizens. Recess time. School has tennis court and ball field, also ten acres of tillable land.

farmer or business man for himself give the project which he is carrying on, and the school work in which he is participating, a reality not otherwise attainable. It heightens measurably his interest in the work and in the related study of the school.

### 8. Earning and Learning

The emphasis put upon home projects in Massachusetts insures that the agricultural instruction shall not be merely academic. Where agricultural instruction is really scientific, there should be no hesitation in putting it to the test of productive work. Of our agricultural instructors and of our boys, it is emphatically true that they are known by their fruits. A tabulation of the agricultural earnings of the boys,

year by year since state-aid and supervision were provided, will be found on page 429. From this it will be seen that in 1917, 518 day pupils earned from farm work $111,500.87, of which $63,751.26 was cash and the remainder credit, given by parents, for work and products. From this report it will also be seen that 2549 adults taught by the itinerant method grew agricultural products for home use to the value

FIG. 43. — Note greenhouse. Greenhouse may be an advantage, but not required for state aid. No other department has one. School has tools for farm shop-work, and a domestic science teacher. Petersham Agricultural Department.

of $45,083.50; and products sold or exchanged, to the value of $28,097.21; or a total value of $73,180.71.

This plan offers the boy, all too eager to quit school for work on reaching his fourteenth birthday, a strong incentive to continue in school; because it undertakes to make him an earner while still a learner. Boys like to feel that as members of the family they are at last able to pay their own way.

### 9. Conclusion

The author believes that home farm work, studied at school and supervised by the agricultural instructor, where conditions are at all

like those in Massachusetts, might well be substituted everywhere for methods of little work, or no work at all of a combined apprenticeship and managerial nature, in the development of vocational agricultural education; and that the project method of bringing agricultural science immediately to bear on actual farm practice, in

FIG. 44. — "Project study" room. Note agricultural "atmosphere." Seeds, seed corn, germination box, signs used in field demonstrations, etc. Sanderson Academy, Ashfield, Agricultural Department.

going commercial agricultural enterprises, conducted by the boys themselves, is a promising solution of the most pressing problem in this field of vocational training. He believes, in short, that the home-project school or department is more to be desired than is the agricultural school which is self-contained.

## CHAPTER III

### PROJECT STUDY *VERSUS* SUBJECT STUDY

#### 1. Project Work and Project Study

THE project plan of vocational agricultural education embodies two distinct features. One is farm work, supervised by a special agricultural instructor, or group of agricultural instructors; the other

FIG. 45. — Note reference books, dust-proof filing cases for orderly arrangement of bulletins, pigeon-holes for notebooks, card-index and agricultural wall charts. A busy corner of a literary workshop where home projects are carefully planned, thoroughly studied, and financially profitable. North Easton Agricultural Department.

is study directly related to that work. Both are essential, and for each careful provision must be made.

Of the two, it has proved to be an easier task for the agricultural specialist to inspire and to direct competent agricultural production, than to amplify and organize the training of his pupils so as to insure thoroughgoing study directly bearing upon their individual enterprises.

#### 2. Project Study Suitable for Vocational Agricultural Schools

(1) **Range and progress.** — Beginning with the boy of fourteen, who, in September, enters a separate or county vocational agricultural

school in Massachusetts, we may graphically represent his training from year to year by Figures 60, 99, 127, and 183, pages 76, 139, 194, and 261. His training should make him acquainted with farm life and affairs in general, and especially well informed and competent in the

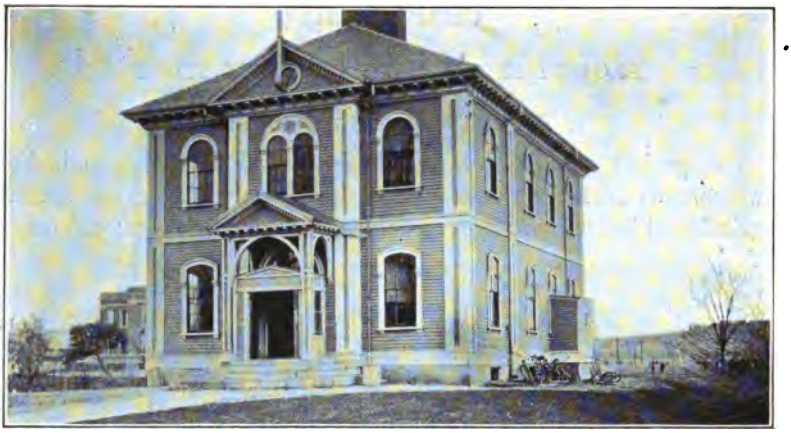


FIG. 46. — Concord Agricultural Department requires two specialists in agriculture, due to large enrollment. Has first floor of this building. No land and no live-stock at the school. Best farmers, including market gardeners and greenhouse men, coöperate. Home projects are among the best in the state.

particular fields covered by his special projects. No boy, as shown in Chapter VI, is required to carry out projects in every field listed; but any boy may do so.

(2) **Studies not on diagram.** — Such subjects as agricultural botany, agricultural chemistry, history, civics, and English may occupy other portions of the time of the pupils in a regular four years' course, as shown in Fig. 188, page 264.

### 3. Project Study Suitable for Vocational Agricultural Departments in Selected High Schools

(1) **Necessary groupings.** — In order to enable one agricultural instructor to direct the project work and related study of each of his pupils during a full half of the school time through a four years' course, groupings by years and projects like those in the following diagrams

in Figure 47 and Figure 48, are necessary. Certain other studies, like those shown in Figure 189, page 265, should be taken.

| **School Years ending 1912, 1914, and Other Even Years**<br><br>**First and Second Year Pupils, One Half School Time** | **School Years ending 1914, 1916, and Other Even Years**<br><br>**Third and Fourth Year Pupils, One Half School Time** |
|---|---|
| **Agricultural science and projects** applied to a given community:<br>**Kitchen gardening**: vegetables, small fruits.<br>**Ornamental planting**: shrubbery, flowering plants, lawns.<br>**Farm-shop work**: making and repairing for home and school use, — hotbeds, cold frames, etc. | **Agricultural science and projects** applied to a given community:<br>**Farm animals**: types, breeding, management.<br>**Farm buildings**: sanitation and conveniences, plans, construction, upkeep.<br>**Farm crops** for keeping the animals, rotations, balancing, cultivating, etc.<br>**Farm machines** and implements, their use and repair. |

FIG. 47. — Diagram of the high school department instructor's courses with older and younger boys, separated into two groups, in even years.

| **School Years ending 1913, 1915, and Other Odd Years**<br><br>**First and Second Year Pupils, One Half School Time** | **School Years ending 1915, 1917, and Other Odd Years**<br><br>**Third and Fourth Year Pupils, One Half School Time** |
|---|---|
| **Agricultural science and projects** applied to a given community:<br>**Small animals**: poultry, sheep, swine, bees, — types, breeding, management, rations, etc.<br>**Buildings and equipment** for small animals, — plans, cost, etc.<br>**Home-grown crops** for small animals, kinds, quantities, seeds, soils, place in farm crop rotation, fertilizing, tilling, harvesting, storing.<br>**Farm-shop work** and other construction. | **Agricultural science and projects** applied to a given community:<br>**Fruit growing**: orcharding and small fruits not before dealt with, propagating, cultivating, packing, etc.<br>**Market gardening**: markets, soils, seeds, fertilizers, tillage.<br>**Buildings and appliances**, plans, devices, implements, and machines, — cost, use, and upkeep.<br>**Farm-shop work** and other construction. |

FIG. 48. — Diagram of high school agricultural instructor's courses with separate groups of older and younger boys in odd years.

(2) **Agriculture first.** — The Massachusetts regulations governing these departments require that when conflict is unavoidable, or when, as at planting or harvesting time, continuous application for a number of consecutive days to his projects becomes necessary, all else must yield to the pupil's proper agricultural instruction, no matter at what cost for the time being to his other studies.

Economic returns as direct incentives to competent training are fundamental here as in the training of vocational agricultural schools.

If experience shows that instruction in the departments should be limited to first and second year projects, pupils desirous of third and fourth year project training may be provided for in separate or county agricultural schools.

### 4. Project Study Concentration. Year Limits

(1) **Pupil.** — As shown by the foregoing diagrams, the range of the boy's training is expected to be somewhat extensive, covering typical farm products which are feasible for his neighborhood. It is designed,

FIG. 49. — Project study room. Note rack for best farm papers, apple packing table with "Boston boxes" next at far corner, seed sower on floor at right, triangle for laying out orchard and setting fruit trees. Concord Agricultural Department.

however, that the training of each year shall be complete in itself; also, whatever other projects he may undertake or continue on his own account, that the pupil's first duty in any given year shall be to carry out certain projects selected from the groups assigned to that year for study.

(2) **Instructor.** — Similarly, while an agricultural instructor may give advice and assistance privately to pupils who are carrying on extra projects, the first duty of this instructor in Massachusetts is to the particular groups of projects published for any given year.

FIG. 50. — Carefully selected agricultural books and bulletins required. Note neatness of arrangement, dust-proof filing cases, and card indexes. Concord Agricultural Department.

(3) **Published year groups.** — In short, upon the particular project groups published for treatment in any given year in Massachusetts, the attention of both pupils and instructors is concentrated. This restriction adds to the value of the December and August meetings to which the instructors are called for the purpose of conferring concerning the projects they are teaching and supervising. The instructors have problems in common for discussion.

### 5. Project Study and Capacity of Pupils

(1) **Individual versus class.** — Careful planning of the project study is necessary on the part of each instructor. The project method

of education, more, it is believed, than all others, takes into account the aptitudes, requirements, and accomplishments of individual pupils as these are revealed from hour to hour.

(2) **Varying capacity.** — Acquaintance with pupils who enroll for vocational agricultural education reveals wide variation among them in capacity for project study. Since farm results under the project method must be obtained, not directly by the instructor, but indirectly through the individual pupils, the instructor's plan should provide for at least an essential minimum of accomplishment on the part of the least capable; for a desirable maximum on the part of the most capable; and for a large body of educational values to be grasped by the greatest number, — pupils who are neither the least nor the most capable.

### 6. Kinds of Project Knowledge

There may be distinguished three phases of instruction in agricultural projects, suited pretty exactly, in their varying scope and degrees of difficulty, to the three fairly distinct kinds or grades of capacity found among the agricultural pupils. An analysis of project knowledge which shows these three gradations will be of direct assistance to the instructor in formulating his project-study program. Following is such an analysis:

(1) **Rules**, or plans and specifications, however simple in outline, and whether on paper or in the mind, are necessary for the intelligent execution of any piece of productive work.

A boy may become a more or less capable farm hand without knowledge in advance of the enterprise, as a whole, upon which he enters. An ordinary laborer is capable of taking orders and of doing routine farm work. Project work under capable supervision should produce a skillful farm hand, but one who desired hand training only should hire out to a progressive farmer.

Project study, the other fundamental of the project method, should produce managerial ability. Good headwork is required for successful farming no less than good handwork. Project study in the case of even the least capable boy admitted to this training should result in evidence of mental accomplishment. A good form of such evidence

is a record on paper of the rules by which that boy proposes to be, or has been, governed in the execution of his productive enterprises. Inability or disinclination on the part of any pupil to find or formulate such rules is evidence of unfitness for this type of training.

Mastery, in short, of the simplest rules by which the success of his productive work must be determined should be looked upon as an essential minimum of accomplishment on the part of the least capable boy who is permitted to remain in the class.

FIG. 51. — State prints bibliography of approved reference and textbooks. Libraries are most liberal in lending. Note tag device for putting on state numbers with soft twine tied through middle of book. Covers library number and is reminder that book is borrowed and should be returned.

(2) **Reasoning.** — Beyond the precise rules necessary for success in any given project, there is the reasoning from experience, or from scientific principles, which is their justification. Most of the members of a class readily penetrate to this reasoning; or, at the hands of a capable instructor, are penetrated by it.

The larger educational efforts of the instructor should be directed toward training his boys, not merely in finding the naked rules by which their project work must be governed, but also in discovering the practical experience or the laws of nature which lie back of them. That is to say, he should aim to possess his pupils of rules, not as "rules of thumb," but as rules of reason.

Good farm management depends upon good judgment, upon reasoning power, — not on ability to find good rules so much as on ability to make them. In the note-books of most of the boys, therefore, there should be recorded the general principles which they have mastered and of which their rules have been but particular applications.

(3) **Broader results.** — The third kind of project knowledge may consist of informational materials of many sorts, — statistical, commercial, geographical, historical, scientific, social, and the like.

Such knowledge cannot be looked upon as a direct tool for carrying

out a project. It may directly supply neither a rule nor a reason. It may, nevertheless, consist of many most interesting discoveries, offer much most excellent educational experience, and be of such a nature as to give the young producer what may be termed, in the broader senses of that expression, agricultural horizon.

Such knowledge falls readily within the grasp of the most capable pupil, and may well be considered for him a most desirable maximum of project knowledge.

(4) **Typical for all projects.** — These three kinds of project knowledge are typical for all vocational agricultural projects and years. Of

FIG. 52. — Poultry appliances for study and comparison. Incubator, brooders and lamps, feeding hoppers, drinking fountains. Better to borrow such equipment. Dealers very willing to lend. Always up to date. Reduces "chores" of care-taking between times, and avoids losses through depreciation. Concord Agricultural Department.

the three, the first and second are in the strictest sense vocational; the third has obvious vocational relations, but may be largely cultural.

(5) **The three R's of the project method.** — It may not be altogether amiss to declare at this point, in express terms, that in these divisions of project knowledge, — "Rules," "Reasoning," and "Broader Results," — we have the three fundamentals, — the three R's, — of agricultural study by the project method.

FIG. 53. — "Related study" materials needed of other non-book sorts. Require care and protection. Uniform mounts and packages aid to orderly arrangement. Note varieties of corn, grain, and grass seeds, heads of grain and forage crops. Concord Agricultural Department.

### 7. Project Study Program and Records

(1) **Of highest importance.** — In view of the above discussion, the project study records of the pupils become of the highest importance. In them we may expect to find the results of the instructor's best efforts as both program maker and teacher.

FIG. 54. — Note pruning tools, small sprayers, garden and lawn tools, bottles of vegetable seeds, cans of chemicals for fertilizers and sprays, boxes for heads of grains and grasses, mount of good and bad cuts in pruning. School lends tools and sprayers for trial before purchase, and rents at cost where funds are more needed for seeds or fertilizers.

(2) **A supposed project.** — A constituent of kitchen gardening is vegetable growing. Suppose that the boy's main project is providing all, or a part, of the home vegetable supply. Suppose a sub-project to be the production of lettuce. Suppose, finally, we agree that the

knowledge related to this sub-project should be assembled in a notebook, and in drawings, accounts, and the like to which the notebook will be a guide.

The aims of the different divisions of the project study may then be represented graphically by the diagram in Fig. 56. The subject

FIG. 55. — Wide-awake instructors keep their bulletin boards up-to-the-minute with seasonal matter. Telephones are a necessity. Instructors are continually called upon for advice by parents and other farmers. Concord Agricultural Department.

matter below the headings is explanatory of the several kinds of knowledge the pupil would find and record.

### 8. Apportionment of Project Study Time and Materials

(1) **Diagram column widths.** — The relative widths of the columns in Fig. 56 may be considered indications of an approved apportionment of time among the three kinds of subject matter, for the most capable pupil. The first column represents the least requirement any pupil should be expected to meet in order to justify his retention in the class. The first and second columns represent requirements most of the pupils should be expected to meet.

(2) **Faculty Coöperation.** — At least three-fourths of the most capable pupil's time should be occupied by the subject matter of

| **Project: Kitchen Gardening**<br>*Sub-Project:* **Lettuce Crop** | | |
|---|---|---|
| 1<br>**Rules**<br>Namely, the Precise Plans and Specifications made for this Project | 2<br>**Reasoning**<br>Namely, Evidence from Science, Observation and Experience that this Project as planned is thoroughly understood and can be defended | 3<br>**Broader Results**<br>Derived from More General Observation and Study |
| *Object:* Skill<br>*Notes should show*<br>The minimum of knowledge of methods, materials, equipment, and operations required for success this year on the land selected for this project.<br>*What to do*<br>*First*<br>*Second, etc.* | *Object:* Managerial Ability<br>*Notes should show*<br>Knowledge necessary for planning a successful cropping system for vegetables, — a system in which the lettuce crop may have a proper place.<br>Mastery of certain principles of agricultural science which find some of their best illustrations in lettuce growing.<br>Principles applicable to lettuce growing under varied conditions, but particularly under those which promise success with this project the present year.<br>*Why's*<br>*and*<br>*Wherefore's* | *Object:* Outlook<br>*Notes may show*<br>Acquisition of a more extensive body of knowledge centering around the lettuce plant and crop. History, botanical classification, utilization, and the like.<br>*Knowledge in itself*<br>*Desirable* |

FIG. 56. — Diagram of Project Study Divisions. — The Three R's.

columns 1 and 2. Column 3 may be covered, particularly in the later years of the four years' course, by special exercises given the most capable pupils by other teachers, such as teachers of botany, chem-

istry, physics, mathematics, drawing, or English.[1] Close coöperation between these teachers and the agricultural instructor should further this end.

(3) **No pupil "held back."** — In order to direct the related study of his class in the most competent manner, the instructor must, of course, organize his teaching materials in advance in accordance with two, at least, of the three divisions of knowledge above described. If he can provide materials of all three kinds, he will have the satisfaction of knowing that the same amount of time may be devoted by the entire class to study related to such a sub-project as lettuce production, and yet that no pupil will be "held back" by any other pupil, — a result most devoutly to be desired in all forms of teaching.

(4) **First column, first in fact.** — It should be emphasized, further, that the first concern of the least capable should be equally the first concern of the more or most capable. The movement of project study should begin at the project, — not, as has too often been the case in the study of agriculture, at some point remote from it.

(5) **High school half-days, spring and fall.** — Probably the most difficult school schedule problems will be encountered, not in separate agricultural schools, but in the high school vocational agricultural departments. High school principals, however, have solved these problems and have been amply repaid for their pains. It is seldom necessary for an agricultural pupil to ask to be excused from a non-agricultural class in order to meet the requirements of his agricultural course, where half-day assignments to agriculture are made. It will be borne in mind that half the school time during the fall and spring terms is to be spent on agricultural project work and related study. It is necessary that this entire allowance, when spent away from home, shall be spent in the room with, or under the direct supervision of, the agricultural instructor.

(6) **More mature and less mature minded.** — Diagrams showing how the less mature-minded group and the more mature may be

[1] For a suggestive diagram showing possible correlation of elementary school subjects with school gardening, see the insert sheet, opposite page 294, of "Among School Gardens," by M. Louise Greene (Agricultural Project Study Bibliography Entry No. 852).

worked to good advantage, during the strictly agricultural half days, follow on pages 73, 74, and 75.[1]

The younger group is assigned to the agricultural instructor forenoons. Parents of these pupils, or their other teachers, are responsible for their afternoons. In these departments, where the entire enrollment should not exceed 20, the pupils may generally be divided into two groups of about equal numbers. Since some of the more mature have already been attending high school, and have started on morning studies two of which they may desire to continue, the older pupils have been assigned to the agricultural instructor afternoons.

(7) **Project study versus agricultural survey.** — It will be noticed that most of each half-day, and, when occasion demands it, the entire time, is definitely assigned to project work or to study related thereto. The project work will be continued during the summer, with school supervision. The project study will not be completed in the fall and spring terms, but will be rounded out by observations made and recorded at other seasons during the entire period required for the completion of the project.

(8) **Class focus.** — The horizontal cleavages set off the first and last periods, — periods which have this in common, that for the time being there is in each period some single focus of attention for the entire class. Here the methods are those with which all are familiar in class recitations or discussions.

(9) **Individual focus.** — The vertical cleavages of the middle periods in Fig. 59 both indicate and emphasize the individual study of each pupil, the careful and the exclusive attention given to the individual needs of each pupil by the instructor, the adaptation of general agricultural principles to the peculiar home farm requirements and facilities of each particular boy in the class. Here the methods are those which have their closest parallels in customary school "laboratory" instruction, whether in drawing room, shop, library, or science laboratory.

[1] Continuous half-day time assignments to project study and project work instructors of the classes who work under their supervision are equally desirable at separate or county schools.

| PERIODS [1] | Forenoon Group: First and Second Year Pupils |
|---|---|
| | **Agricultural Survey (Elementary):** *About 75 Periods* |
| | *Object:* General Study of Agricultural Production and Rural Life. |
| 9.00 | *Textbook:* "Beginnings in Agriculture," by Mann.[2] Put emphasis on Soils and Plant Life Portions in year for Horticulture; on Animal Portions in year for Animal Husbandry. Give much attention to suggested problems. |
| to | *Omit* this agricultural survey exercise whenever the entire forenoon should be devoted to productive work, or to library, laboratory, or other instruction bearing directly upon that work. |
| 9.45 | |
| | **Project Work or Project Study:** *About 300 Periods* |
| 9.45 | *Object:* Execution of Home or School Productive Projects undertaken by the individual pupils, coupled with laboratory, library, and other study and observation directly bearing upon those projects. |
| | *Concerted Attack* by the entire class on Plant Projects in even years (1912, 1914, etc.), and on Animal Projects in odd years (1913, 1915, etc.). |
| to | *An Extra Project* in Animal Husbandry may be undertaken in an even year by special arrangement with the instructor; as, also, one in Horticulture in an odd year. |
| | *Reference Books and Bulletins*, including Agricultural Laboratory Manuals, will here be consulted according to the ability and needs of the individual pupils. |
| 11.15 | *Notebooks*, carefully kept, record in order the ideas and plans derived from this individual instruction, for guidance in carrying out individual projects. |
| | *Method:* Minimum of class instruction; maximum of personal, individual guidance. The instructor goes from pupil to pupil, as does the teacher in shop work, laboratory, or drawing room. |
| | **Project Work or Project Study** (*continued*)<br>**Class Discussion of Individual Projects:** *About 125 Periods* |
| 11.15 | *Object:* To subject individual ideas and plans to the criticism of the entire class, and thus to clarify principles and intensify impressions. |
| | *Round-up of Opinion:* The value of closing each forenoon with this class discussion grows out of the fact that though each has been working on |
| to | his particular project, all have been working upon the same sort of project, at the same time; as, for example, lettuce as a kitchen garden crop. A device for making all acquainted with what each is doing, and showing that general rules must often be modified in order to meet |
| 12.00 | local needs. A means for developing the managerial type of mind. |

FIG. 57. — Diagram of Agricultural Periods for Selected High Schools in Fall and Spring Terms where sessions are from 9 to 12, and from 1 to 4 o'clock.

[1] Periods may be the same length and number as those of any school. Reserve the first for the "Survey," the last for the "Round-up," and the body of the morning for individual instruction. Periods on projects in summer are determined by the work undertaken, and are covered by daily time sheets.

[2] Other books have been approved. The book best adapted to local needs should be selected. See pages 157 and 158.

(10) **Prime merits of this apportionment.** — It is one of the most important merits of this project method that the instructor is thus able

| PERIODS [1] | **Afternoon Group: More Mature-minded Pupils** |
|---|---|
| | **Agricultural Survey (Advanced):** *About 75 Periods* |
| 1.00 | *Object:* General Study of Agricultural Production and Rural Life. |
| to | *Textbook:* "Elements of Agriculture," by Warren.[2] Vary emphasis in alternate years to accord with subject matter of project work. View local conditions in light of text. |
| 1.45 | *Omit* this survey exercise whenever the entire afternoon should be spent in project work, or in observation or study directly related thereto. |
| | **Project Work or Project Study:** *About 300 Periods* |
| 1.45 | *Object:* Execution of Home or School Productive Projects, coupled with library, laboratory, and other study and observation directly related to those projects. |
| | *Concerted Attack* by the whole class upon Animal Projects in even years (1914, 1916, etc.), and on Plant Projects in odd years (1915, 1917, etc.) |
| to | *An Extra Project* in Horticulture may be carried out by special arrangement with the instructor, in an even year; or, in Animal Husbandry, in an odd year. |
| | *Reference Books and Bulletins*, including Agricultural Laboratory Manuals, will here be consulted, according to the ability and needs of the individual pupils. |
| | *Notebooks* are carefully kept, for setting in order the ideas and plans derived from this individual instruction for guidance in executing the projects undertaken for profit by the individual pupils. |
| 3.15 | *Method:* Same as in forenoon for first and second year pupils. |
| | **Project Work or Project Study** (*Continued*)<br>**Class Discussion of Individual Projects:** *About 125 Periods* |
| 3.15 | |
| to | *Same Purposes* to be served here as in corresponding period for less mature group. |
| | (See last period of previous diagram.) |
| 4.00 | |

FIG. 58. — Diagram of Agricultural Periods for Selected High Schools.

[1] See footnote on preceding page as to length and number of periods. Same rules to apply to more mature, as to less mature pupils.

[2] Other books have been approved. The book best adapted to local needs should be selected. See pages 157 and 158.

to deal with the particular needs and capacities of individual pupils, and at the same time maintain close, efficient and progressive class organization and control. Both pupil and instructor pass from the "familiar" method of the recitation or laboratory demonstration

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| First Period | **Agricultural Survey:** Single focus of attention for the entire class, viz., the common textbook subject or problem assigned the previous day. | | | | | | | | |
| Middle | **Boy A** | **Boy B** | **Boy C** | **Boy D** | **Etc.** | **Etc.** | **Etc.** | | |
| | INDIVIDUAL AGRICULTURAL PROJECTS. | | | | | | | | |
| Periods | Each boy studying his own projects one by one, with the instructor's aid. | All the boys, however, may, for example, be working out their lettuce problems at the same time. | Therefore each may be able to make contributions of value to the whole class. | For this reason the final period of the half-day is reserved for a "round-up." | The instructor will pass from boy to boy during these middle periods. | Two or three boys may work together on a laboratory experiment. | Eight or ten boys are enough for a single group. | | |
| Last Period | **Round-up** of ideas derived from the individual study of the middle periods. Again, a single focus of attention. | | | | | | | | |

FIG. 59. — Another Diagram of the Agricultural Half-day.

provided for in the first period, to the "less familiar" seminar or individual study and guidance method of the succeeding periods. Radical changes in attitude of mind are inevitable in passing from the general "survey" of agriculture to the searching for help toward the solution of pressing local problems in the "project" study periods, and then to comparison of problems with problems, and project with

project, by the pupils in the "round-up" period. And there are important accompanying changes of physical attitude and activities.

Both physiologically and psychologically, therefore, this massing and apportionment of time are not merely defensible; they are highly desirable. They establish model conditions for achieving the best results now striven for in secondary education by Professor Alfred L. Hall-Quest and others through "supervised study."

### 9. Vegetable Growing Project Study

We have seen that vegetable growing is among the projects assigned for first or second year study. The pupil brought up on a farm is likely to bring to the classroom considerable familiarity with several kinds and varieties of vegetables. It remains for his agricultural

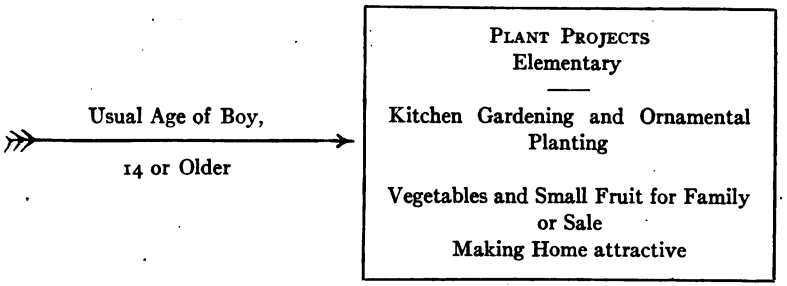



Fig. 60. — First-year projects focus upon plant production. Preference for such projects for beginners was published first, for state-wide application in Massachusetts, in September, 1911. This applies to Schools in all years; and, as explained in the text, in even years to high school departments. See pages 59–61.

instructor to amplify his knowledge and experience to the fullest possible extent.

The following chapter gives suggestive outlines for vegetable growing, together with a brief preliminary discussion of various possible classifications of vegetables and a list of vegetables successfully grown in Massachusetts home gardens. It is therein stated that probably it will be feasible in most cases for the pupils to undertake to grow eleven varieties, illustrative of the eleven groups of vegetables which may be distinguished from the very practical point of view of their methods of cultivation.

The requirements and tastes of most families make it easy to secure the consent of parents to the growing of this number of varieties in sufficient quantity for the home supply. In addition, each pupil is encouraged to grow at least one variety on such a scale as to provide a surplus for sale as a cash crop.

The pupil may be helped at will, in the actual work of his vegetable growing, by members of his family, by exchanging work with fellow pupils, or by hired labor. It is essential, however, that he himself,

FIG. 61. — Boys of fourteen begin with home gardens. Eleven varieties of vegetables are generally grown, at least one from each class, such as "root" crop, "cole" crop, "cucurbitous" crop, etc. Irving McCabe's home project. First year. Clean cultivation. Dust mulch. Concord Agricultural Department.

with, of course, the aid of his agricultural instructor, shall plan his project and manage it; shall be taught, and shall attain proficiency in, every phase of the actual work of his productive enterprise; and, finally, shall render a written report and an accurate account of all expenditures and receipts in connection with his undertaking.

In vocational training the economic aspects of the projects carried out by pupils are of the utmost importance, both as to manipulative skill and as to sagacity in management. Work, use of teams and tools and such materials as stable manure, for which cash is not paid,

should, therefore, be charged at fair valuations against the projects. There should be proper charges for rent, or for interest on the capital invested and used. And all products, whether furnished

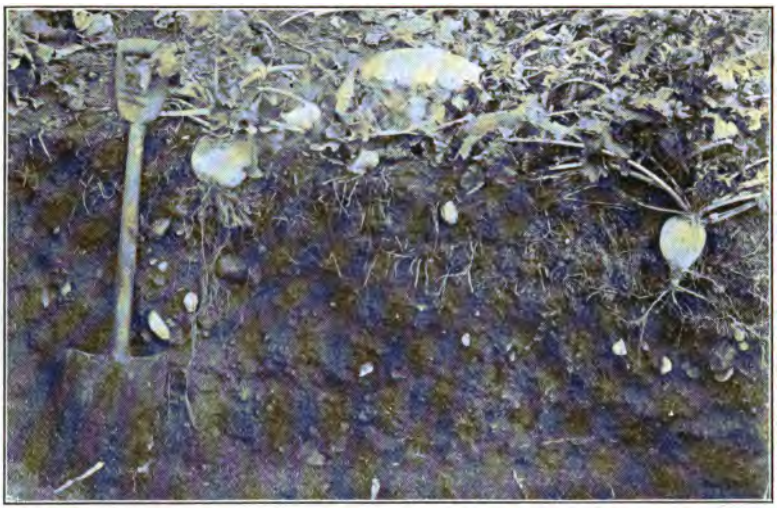


FIG. 62. — Field studies are interwoven with field work. Excavation by class. Roots gently washed out. Root systems of different vegetables studied and compared. Object, best tillage for each class of vegetables. Not a boy who made this study had slightest idea prior to this exercise that turnip roots penetrate into ground a shovel's length. Essex County Agricultural School.

the family, given away, or sold, should be credited to the projects at current retail prices. The suggestive outlines in Chapter IV include questions on the economic elements of project study.

### 10. Small Fruit Growing Project Study

The best home gardens are seldom considered complete without an abundant supply of small fruits, such as blackberries, raspberries, gooseberries, currants, and strawberries. Grapes, also, are sometimes included. The small fruits are often found in the same inclosure with the garden vegetables. When we add that the garden is generally most convenient if located near the house, and that all of these small fruits, save strawberries, are tall or moderately high growing, we have

said about all about them that can be said in general for assistance in garden planning.

Farm boys are more or less familiar with the above facts. Following, therefore, the making of the preliminary garden sketch, which should show intention to grow one or more small fruits, the small fruit project study will best deal with individual varieties, and be guided by outlines like those suggested for varieties of vegetables.

### 11. Beekeeping Project Study

Beekeeping is an interesting and profitable side line in well-balanced farming. It is particularly important where any considerable attention is given to fruit and vegetable growing. It is, therefore, a worthy project for first or second year pupils.

Every agricultural pupil should be taught the importance of bees in their relations to economic plants, and their nature and possibil-

FIG. 63. — Identification, comparison, and various laboratory as well as field tests of chemicals used in home-mixing fertilizers. Note folding table. Some of these boys now six-footers and holding good positions as expert gardeners; one of them is an expert dairyman. North Easton Agricultural Department.

ities as economic animals. So much knowledge is included in the general study of agriculture, by both the younger and the older pupils,

during periods set apart in the foregoing diagrams under the designation "Agricultural Survey."

Every vocational agricultural school and department should own, work with, or have access to at least one hive of bees. Undoubtedly certain pupils will desire to conduct beekeeping projects. Project study outlines should be prepared for them, and should cover at least the first two of the three kinds of project knowledge before discussed.

FIG. 64. — Agricultural classes drilled in judging home-grown potatoes by use of score card. Neither land nor live-stock at this school. Marlborough Agricultural Department.

Since pupils are not to be required to conduct projects in every field covered by the published course of training, beekeeping may be looked upon as one kind of project from which, at their desire, or at the discretion of the instructor, pupils may be held exempt.

### 12. Poultry Keeping Project Study

It may safely be urged that every pupil should be permitted, and even required, to conduct a poultry project.

Poultry keeping is a branch of production found on every farm and at many village homes; yet a branch from which, when con-

ducted on a strictly business basis, it is very difficult to make a profit. It has to do with farm products which are of very great economic importance for the advancement of agriculture in a state like Massachusetts, which, while admirably suited to poultry keeping, imports $25,000,000 of poultry and eggs annually, and produces less than $6,000,000 worth per year.

Owing to the attention now being given poultry keeping by the agricultural colleges and experiment stations, materials for teaching

FIG. 65. — New kind of high school examination. Naming of vegetable seeds mixed and put on paper plates. Seeds studied for shape, color, plumpness, and percentage of germination. Concord Agricultural Department.

the subject scientifically and practically are increasing, and make this one of the most promising lines of project instruction for school use.

Poultry keeping affords one of the best projects for transition from the boy's treatment of animals as pet stock, to his treatment of them as vital factors in economic agricultural production.

Project study outlines of the sort suggested for vegetable growing will be just as necessary here as elsewhere for the proper guidance of the poultry project pupils.

### 13. Sheep and Goat Husbandry Project Study

Sheep and goats in some localities are matters of keen interest and economic importance; in other localities they are not.

As to general knowledge and possible exemptions, what was said of beekeeping should apply equally here. Projects should be permitted when strongly desired; and, when permitted, properly guided by appropriate project study outlines.

### 14. Swine Husbandry Project Study

Swine husbandry should, probably, in most cases, be ranked as nearly equal in importance to poultry keeping, — perhaps midway

FIG. 66. — Asparagus growing. "School project." Putting in new plantation. Interesting study in vegetable growing. A money-making crop in some parts of the state. Smith School, Northampton.

as school projects between poultry keeping and beekeeping. Projects in this field should be optional with the individual pupils. Some knowledge of swine husbandry will be had through the agricultural survey study and its attendant trips for observation.

Where the home farm conditions are at all favorable, swine projects should be urged, and outlines for their proper study provided.

### 15. Ornamental Planting Project Study

Few good farmers are entirely heedless of the attractive appearance of their farm property as farm homes. Some attention should be given by every agricultural pupil to such ornamental planting as is appropriate under reasonably thrifty farm home conditions. During at least one year of his course, along with his utility projects, every boy should carry a project devoted to the beautifying, in at least some slight measure, of his home surroundings.[1]

Some study will have been given farm home attractiveness during the periods devoted to the "agricultural survey." Good home project work, however, will be as dependent here, as elsewhere, upon project study outlines carefully adapted to each pupil's home conditions.

### 16. Third-year and Fourth-year Project Study

The project study method is identical for all years. When, therefore, pupils have progressed so far in the course as to be prepared for it, third-year and fourth-year project study should be provided for in the manner already indicated. Project study outlines for fruit growing, including orcharding, should be drawn; outlines, also, for the handling of certain vegetables from the market gardener's point of view, for the production of other important cash crops, and for dealing with the serious problems of dairying.

Every advantage in this outline making should be taken of the opportunities thus afforded for the thorough reviewing of the basal principles of plant production and animal management already dealt with in the project instruction of the two previous years. This reviewing should insure a consistent and closely knit body of knowledge supported by the practical applications of that knowledge. It should also make it possible for an older boy who has had good farm experience to enter the course to advantage at the beginning of the third, or even of the fourth, year. Particular attention in the senior year should be given to the study and application of the principles and methods of good farm management.

[1] List of ornamental plants successfully used at Smith Agricultural School, Northampton, Mass.: (Continued on pages 84–85.)

The field of study one year, here, as earlier in the course, should be restricted to, and concentrated upon, plant projects; and the next year centered upon animal projects.

The method of procedure is believed to have been elucidated with sufficient clearness in the foregoing discussion and in the following chapter containing suggestive project study outlines for vegetable growing, so that its application to third-year and fourth-year project study need not at this point be further elaborated.

## 17. Project Study Perspective

Looking back, now, over the project plan of vocational agricultural education, as analyzed and expounded in the present discussion, two facts should stand out in clear relief. Certain kinds of projects are elective; others are prescribed.

*Annuals*

Marigolds (African).
Marigolds (French).
Zinnias.
Nasturtiums.
Calliopsis.
Candytuft.
Salpiglossis.
Centaurea.
Eschscholtzia (California Poppy).
Mignonette.
Asters (Semple's Branching).
Portulaca.
Nicotiana.

*Shrubs*

*Berberis Thunbergii*, Japanese barberry.
*Cornus Siberica*, Red-twigged dogwood.
*Forsythia suspensa*, Yellow bells.
*Ligustrum Regelanum*, Regel's privet.
*Lonicera Morrowi*, Morrow's honeysuckle.
*Lonicera tartarica*, Tartarian honeysuckle.
*Philadelphus coronarius*, Syringa.
*Pyrus Japonica*, Japanese quince.
*Rhus typhina*, Staghorn sumach.
*Rhus glabra*, Smooth sumach.
*Ribes aureum*, Yellow currant.
*Rosa rugosa*, Japanese rose.
*Sambucus Canadensis*, Elderberry.
Spirea Von Houtei.
Spirea *Thunbergii*.
Spirea *callosa*.
*Physocarpus opulifolius*, Ninebark.
*Syringa vulgaris*, Lilac.
*Viburnum opulus*, High-bush cranberry.
*Aralia spinosa*, Hercules club.

*For Cuttings*

Hard wood: —
Spirea Von Houtei.
Spirea *Thunbergii*.
*Syringa vulgaris*, Lilac.
Privets.
Forsythia.
*Philadelphus coronarius*, Syringa or Mock Orange.
*Rhus typhina*, and *glabra*.

Green: —
Geraniums.
Salvia.
Rex begonias, for leaf cuttings.
Cannas, tuber cuttings.

(1) "**Improvement**" **and** "**trial**" **projects desirable.** — The projects termed "improvement" and "trial" offer excellent incentives to project work and to project study.

The first may contribute most towards the training as a whole by being confined to projects which appeal to, and tend to develop, the pupil's sense of attractiveness, order, and fitness, in farm home appointments and surroundings. These will touch his pride.

FIG. 67. — Agricultural instructors demonstrate the handiest ways of doing work, and speed up the work by setting the pace. Forking manure and properly preparing land for a garden. Hadley Agricultural Department.

The second may make its best contribution by appealing to, and nurturing, the element of daring, — the tendency of youth, even at some economic risk, to get out of ruts. Appropriate projects

*Herbs*

Dill, Thyme, Lavender, etc.

*Vines*

Cinnamon, Virginia Creeper, *Ampelopsis tricuspida.*

*Bulbs*

Indoor forcing and outdoor use:

Narcissus. Tulip Hyacinth

Miss S. M. Weed, instructor in ornamental planting at the Smith School, Northampton, several years, made the following observations regarding the above lists:

"Any of the flowering plants listed are easily grown at home. Choice and range of plants for home gardening depend entirely upon the resources of individual pupils, — amount of land available, location, nature of soil, etc. An assortment of from six to ten varieties is about the number most profitably cared for by the majority, but, as I have stated, this number varies greatly.

"As an incentive to home work might be mentioned starting plants at school, to be taken home for use later. Asters, cosmos, and pansies are good plants to use in this way. It is also an advantage to have on hand seeds of standard quality and kind which pupils may buy from the school, thus insuring the use of good seed."

for the second are to be found by following the best leadership in animal and plant feeding, in plant and animal breeding, in selection of plant and animal foundation stock in the light of comparative records of production, and the like. Such projects will arouse his courage.

Both will have pronounced values as elements of vocational agricultural education, for both will be directly aimed toward a more favorable farm inventory and toward considerably increased farm

FIG. 68. — Class exercise. Making their first hotbeds at the school. Hadley Agricultural Department.

profits. Both, moreover, may be made to contribute almost as much to community as to private betterment and well-being.

(2) **Productive projects fundamental.** — First and without fail, however, in vocational education, should come the projects termed "productive."

The scale of the improvement and trial projects may be modest. The scale of the productive projects must be extended, occupy as much as possible of the time, and engage as much as possible of the energy of the pupil. Entering upon a productive project should be an indication of the pupil's determination to go just as far as he can in any

given year, not only towards learning how to become a self-respecting and self-supporting producer of farm products, but also toward putting that knowledge into practice.

Vocational agricultural education, in short, means, if it means anything, the constant interworking of ideas and action. It means the educational unity of two practically simultaneous processes, the processes of *earning* and *learning*.

The logic of making the productive projects fundamental is the logic of life. First, man must provide his subsistence; next, a surplus

FIG. 69. — Farmers and schools coöperate. Boys made hotbed frame and sash at the school. Excavated and put frame in place on farm of Mr. Spooner, who paid for all materials. Boys then made their own hotbeds, sash, and straw-mat covers. Brimfield Agricultural Department.

for barter, sale, or other use. Then out of his surplus he may rightfully take risks, or make non-productive investments of time or capital. And this holds true no matter how slight the risk, nor how modest the non-productive outlay.

Happily, projects primarily productive, involving, as they must do, considerations of quality no less than those of quantity, are not without vital elements of training in attractiveness, order, and fitness. Moreover, the boy's success in his enterprises aimed at profit is more than likely to be directly proportionate to his daring enlistment under the leadership of the newer agriculture. Productive projects alone,

therefore, may contribute to the education of the pupil something of those elements which are the more direct aims of projects termed "trial" and "improvement."

The agricultural instructor, in approving projects to be undertaken by his pupils, will, therefore, make no mistake. His primary concern must be vocational agricultural education through productive projects. Productive projects may, in any given year, and at a pinch in all years, be taught to the exclusion of all others. "Improvement" and "trial" projects, where found feasible, are desirable. "Productive" projects are fundamental.

### 18. Project Study versus Subject Study

Critics, familiar with the curricula and methods of teaching common to most public schools of secondary grade, have remarked a radical difference of method between subject teaching and teaching by projects. Fear has occasionally been expressed that the project innovation in educational methods may, apart from the skill it gives, result in putting the pupil in possession of merely a more or less incoherent collection of knowledge fragments.

FIG. 70. — "Pricking out" lettuce. Tricks of the farmer's trade taught in the different operations covered by the agricultural courses. Hadley Agricultural Department.

(1) **Subject study. A. Organized knowledge.** — Subject study, it is urged, puts the pupil in possession of coherent bodies of organized knowledge. Subject study, moreover, it is pointed out, so far, at least, as it is of the more modern type, takes into account the environment of the pupil; and the practical bearings of his education, so far as it has any, are thus made plain to his understanding. Subject study stops short

at this point. For applied knowledge as such it recognizes no responsibility.

**B. Deferred values.** — Having been schooled in terminology and principles, also in orderly and efficient habits of reasoning, and having been led to make certain laboratory and other observations as to the applications of principles in the work-a-day world, the pupil must then be trusted to develop efficiency on his own account in one or another field of applied knowledge. The principal values properly to be expected from subject study, therefore, have been termed "deferred values."

**C. Agriculture and subject study.** — Agriculture has generally been taught by the subject method.[1] A part of the farm boy's year, usually the summer, has been spent on his home farm; another part of the year, usually the winter, or the months of the customary school year, has been spent, in most cases at a considerable distance from his home farm, at the agricultural school or college. In the former, his attention has been devoted to productive agriculture; in the latter, to agriculture as more or less divided bodies of organized knowledge.

FIG. 71. — Rows must be straight and accurately spaced. Sower must be properly adjusted to size and kind of seed. Hadley Agricultural Department.

[1] Following is the list of subjects found in the undergraduate course of training once prescribed, by one of the most prominent agricultural colleges, for prospective teachers of agriculture. With the subjects are given the hours required for each. The baleful significance of this list is found in the tendency for beginners in teaching to be imitative, to try to teach the same subjects by the very same methods by which they themselves have been taught.

| | | | | | |
|---|---|---|---|---|---|
| Agronomy | 21 | Thermatology | 2½ | English | 4 |
| Animal husbandry | 16 | Botany | 6 | Rhetoric | 9 |
| Dairy husbandry | 8 | Chemistry | 15 | Economics | 2 |
| Horticulture | 15 | Entomology | 2½ | Education | 8 |
| Secondary school agriculture | 6 | Zoölogy | 5 | Library science | 2 |

**D. The unaided farm boy.** — To the farm boy himself, alone and unaided by the supervision of his agricultural instructors, has been left the educational task, well-nigh impossible, under such circumstances, of bringing these elements of his experience — one concrete

FIG. 72. — Mechanism of farm and garden machines carefully studied. This sower is lent to pupils who lack such labor-saving equipment. North Easton Agricultural Department.

the other abstract — into efficient relations, whether for purposes of intelligent understanding or for purposes of economic returns, with the result that the anticipated values of such subject study have too often been deferred indefinitely.

**E. Education in forgetting.** Judging from the experience of many pupils, and among the number not a few who have gone on to college, much secondary education by the subject method might justly enough be called "education in forgetting." In fact, it has sometimes been argued that the educational process, as a process, as a means of developing mental alertness, acuteness, and power, is the main concern of the subject study method; that the forgetting is to be expected, is not to be too much deplored.

The structure and habits of the human mind and brain are such that, following the psychological laws of segmentation, unused knowledge tends to be "forgotten." Much, a vast deal, of the subject matter dealt with by the subject study method is of such a nature that in out-of-school hours and in after-school years it remains unused.

FIG. 73. — Tank filled with water. Local soils in glass tubes. Rate at which water rises and saturates soil in each tube noted, and rates for the different types compared. Other tests for rates of percolation, water-holding capacity, and evaporation. North Easton Agricultural Department.

To the extent that it remains unused, its forgetting, save by minds supported by the most unusual brain substance, is inevitable. Whether to be deplored, therefore, or not, it has over and over again been observed, that examinations once passed and the school year ended, subjects are forgotten.

**F. Subject study merits.** — For the training of the so-called "abstract-minded" boy, of the boy naturally gifted with a retentive cerebral organism, and of the boy who is to follow a professional as distinguished from a productive career, the subject study method must be conceded appreciable merits; and these merits become the more pronounced and permanent in proportion as the method, in its dealing with materials and principles, is strongly inductive.

FIG. 74. — Project of Joseph Powell, 16, a city boy. Never had hoe in hand until 1914. Note his straight rows and clean cultivation. Best garden at that date seen by state supervisor. City boys can learn farming. Bristol County Agricultural School.

**(2) Project study. A. Accompanied by subject study.** — Merits conceded subject study, however, are not to be subtracted from the total merits of vocational education. The education of the boy who desires a vocational agricultural diploma includes, as we have seen, the subject study of English, history, civics, botany, chemistry, and general "agricultural survey" study of such subjects as soils, tillage, and crop rotation. That this subject study does not precede, but accompanies, or follows, the boy's project study, directly and decidedly enhances its value.

**B. Organization of common sense. (A) Induction and application.** — But project study has merits peculiarly its own. No more diligent or effective application of the inductive method in education has ever been witnessed than that proposed, and in good measure already practiced, by the project study of agriculture. The educational cycle is not left open, but is here completed. The movement, from observed data of agricultural production to general laws and

FIG. 75. — Joseph Powell's project again. Potatoes in bloom. Kept free from bugs and blight by careful spraying. Had never before seen a "potato-bug." Part of ¼ acre garden project at school. Accounts well kept. Valuable experience, plus $174.12 farm earnings. Now a graduate and farming. Bristol County Agricultural School.

principles, is followed by the reverse movement, which is embodied in the application of the laws and principles of science, embodied, that is to say, in economic agricultural enterprises conducted by the pupils on their home farms under competent school supervision.

**(B) Personal economic interest at stake.** — Mr. Huxley's favorite definition of science is understood to have been "organized common sense." The project study method consists, not so much of the conning of "science" already organized and brought to the boys in

books, as it consists of the actual organization anew of the common sense required for successfully controlling the personal affairs and economic fortunes of the pupils themselves. The "career motive" is here dominant, inspiring, compelling. Upon the organization of common sense is put a strong, personal premium.

(C) **Natural versus artificial units.** — The units of project study are not the units of another man's career nor of another man's book.

FIG. 76. — Both hand work and horse work taught each boy. Bristol County Agricultural School.

They may, nevertheless, consist of findings from many sources, including picked careers and selected books.

Olericulture may be made a subject study; so, also, may chemistry. Rarely, however, does the subject study of chemistry, for example, include all of chemistry. The limits set are arbitrary.

The lettuce crop to be produced by the pupil in a given year is a project study unit. As such it requires mastery of certain portions of both olericulture and chemistry. The requirements for producing the crop under the known home conditions mark the limits of this unit. These limits are not artificial; they are natural. The kinds of knowledge to be gained have been indicated above by the suggested

FIG. 77. — Most of the boys get experience with all phases of farming, every year An excellent apperceptive foundation thus laid on which to build the intensive "project study" and "project work" assigned the various years of the course. Joseph Powell, at left, helping with the fruit harvest during first year in school. Bristol County Agricultural School.

contents of the boy's project study record. The boy's knowledge may be complete for its purpose, — an organized unit, a body well articulated and thoroughly comprehended.

The project method deals with natural units. By this method the boy's common sense is focused, clarified, and put directly to important economic tests.

**(D) Project study units and pure science data.** — Project study, moreover, will probably prove to be one of the most effective means of accumulating first-hand data for the successful study of science as science. The lettuce plant, for example, thrives best in almost any garden soil when fed freely one particular kind of plant food, namely, nitrogen. The pupil must, therefore, know this raw material of chemistry, not at the outset in its every form and use, but in the special form best suited to the needs of the lettuce plant. He may learn to think and speak of it by the symbol the chemist has assigned it. That symbol will, then, have been learned once for all. Later, in other project study, he will learn more about nitrogen in its relations to productive agriculture. One by one, if wisely taught, he will similarly come to know other elements of plant or animal food, together with their symbols. He will come to know them in an intimate, personal way, by name and symbol, by appearance and action. All this will surely be gain, and not loss, if later the boy has opportunity to study these chemicals in their more general relations.

**(E) Education in remembering.** — The knowledge which is the boy's quest in project study is knowledge of which he sees the need. Being needed year by year, it will, year by year, be recalled. Used again and again, added to, modified and exactly applied, it will tend to be distinctly remembered.

If unused knowledge tends to be forgotten, the converse is most emphatically true. Used knowledge tends to be remembered. The primary pursuit of project study as the accompaniment of project work is the organization of definite and coherent bodies of knowledge which the recurrent seasons will naturally and of necessity call into use. Forgetting here is a hindrance. If it occurs, it is not a virtue but a fault.

In short, the organization of common sense by the project study method is not education in forgetting; it is education in remembering.

**(F) Traditions of success versus traditions of defeat.** — Educators and public-spirited people in general are gravely concerned over the yearly exodus from school of the army of children whose schooling is halted the moment the fourteenth birthday is reached. But why should they not go out?

In a vast proportion of cases their lot in school has been far from happy. The "bookish" boy has been, and may always

FIG. 78. — Joseph Powell helping set up corn harvester which had been bought "knocked down." Did gardening largely morning and evening, so eager was he to round out his experience with every seasonal operation on the farm. Not a hired man on this farm. Boys and their instructors make farm practice square with classroom teaching. Bristol County Agricultural School.

be, the exception and not the rule. Taught by one sort or another of subject study method, and failing to see, much less to feel, direct relationship between what they have studied and what they are likely to be and do in life, too many have "failed in their studies." Their school traditions have been traditions of defeat.

If anything can efface the depressing memory of such traditions, by establishing traditions of school success, it is believed that the

project method of vocational education can do it. And probably no field for this is more favorable than that of agriculture.

Boys, especially farm boys, like the open. They are curious about plants and animals. They readily come to know them. They like to possess them. When school begins in the open and ends there; when in the schoolroom are found undreamed-of guide books to more wonderful and intimate understanding of the already familiar objects of the open; most of all, when the school teacher meets the boy where his interest is keenest, and shows him how to turn his possessions, or those of his father, to better economic account, — then schooling becomes a new experience to the boy. It becomes part of his life, not something apart from it. Traditions of success in school become possible of attainment. They become for the majority inevitable. Than this, project study, perhaps, can hope to achieve no finer result.

## CHAPTER IV

### ILLUSTRATIVE PROJECT STUDY OUTLINES APPLIED TO VEGETABLE GROWING

#### 1. Project Study Outline Making in Massachusetts

Of admirable agricultural textbooks, reference books, bulletins, reports, papers, and periodicals, there is now almost a superabundance, and the supply is steadily growing.

The principal problems, therefore, of the agricultural instructor, responsible for putting into effect the project plan of vocational

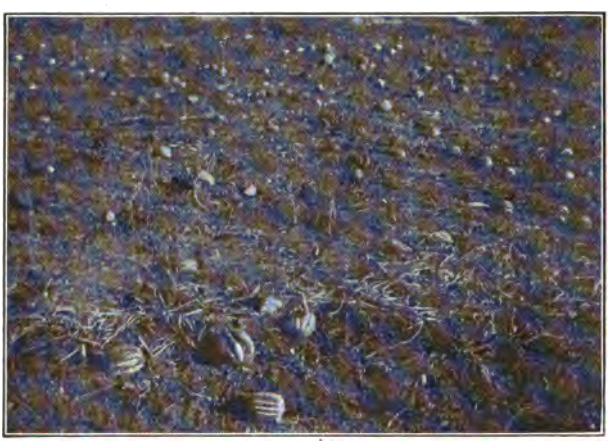


Fig. 79. — Project vicissitudes. Clarence Goodnow, 16, planted ½ acre muskmelons, May 25–26. Cutworms and dry weather killed them.. Replanted June 8. Sept. 8 splendid crop fast maturing. Vines killed by unseasonable frost, Sept. 9. Looked "like a field of cannon balls," he said. Paid for labor but no profit. But like most of the boys he had other projects. His total earnings from farm work that year were $227.75. Petersham Agricultural Department.

agricultural education, are the problems of making selected portions of this literature available for his particular boys and their particular

projects, and of establishing habits of study which make consultation of many authorities both natural and rewarding.

The present chapter discusses but one field of agricultural project instruction, and this with special reference to the work and study of first or second year pupils. It suggests outlines following which the pupils may prepare themselves directly for their work and at the same

FIG. 80. — Orin Butcher, 19. Has curvature of spine. Had been out of school. In best health when much in open. Permitted to take agriculture part time. Worked $\frac{1}{10}$ acre. Income before taking course, $33; first year of course, $59.30. What rate is this per acre? Continued study. Bought more land, on which he is now a gardener and poultry man. Concord Agricultural Department.

time be taught how to gain information from all sorts of reference authorities.

These outlines have proved to be useful models. They show the economy in outline-making of using numerals instead of titles for references. The heavy-faced numerals are the numbers assigned to certain titles in the "Agricultural Project Study Bibliography," which was published by the Board of Education in 1912 as Bulletin

No. 10, and which, with later accessions, appears here as Chapter V. The numerals in lighter-faced type refer to pages.

The numbers assigned the titles were adopted by all the vocational agricultural libraries in the state. This has made all subsequent outlines interchangeable and serviceable throughout the system.

Outlines modeled after those in this chapter and applied to all of the other fields of project study have been prepared by the agricultural instructors in Massachusetts. Most of these are in typewritten or mimeographed form. To accelerate this work among the more experienced men and to forward the work of beginners in teaching, two bulletins containing project study outlines adapted to first and second year pupils were proposed. There was collaboration and a fine spirit of rivalry. The outlines grew out of day-to-day requirements. They were on the spot products of efforts everywhere in Massachusetts to make project study and project work interlock.

Bulletin No. 28, 127 pages, printed in 1913, contained outlines on growing and studying:

| | | | |
|---|---|---|---|
| Beans | Celery | Parsnips | Rhubarb |
| Beets | Cucumbers | Peas | Spinach |
| Cabbages | Melons | Potatoes | Sweet Corn |
| Carrots | Onions | Radishes | Tomatoes |

The author edited the outlines, and at the head of each gave credit to the contributors. Following is an example of such credit:

"In this project study outline" on potato growing "are incorporated the questions and references prepared by five instructors for their work with vocational agricultural pupils in 1912–1913, as follows:

| | |
|---|---|
| Mr. Thomas Bradlee, Northampton . . . . | 228 questions, 251 references |
| Mr. J. Coryell, North Easton . . . . . | 174 questions, 220 references |
| Mr. J. G. Powers, North Easton . . . . . | 145 questions, 172 references |
| Mr. L. B. Boston, Petersham . . . . . | 148 questions, 168 references |
| Mr. E. J. Burke, Hadley . . . . . | 74 questions, 81 references |

"Bulletin No. 36, 139 pages, was prepared in a similar manner and was printed in 1914. It consisted of poultry project study outlines on production and sale of:

| | | |
|---|---|---|
| Chicks | Roasters | Turkeys |
| Broilers | Breeders | Ducks |
| Fryers | Eggs | Geese" |

To it seven agricultural instructors contributed as follows:

| | |
|---|---|
| Mr. L. B. Boston, Petersham | 231 questions, 186 references |
| Mr. Thomas Bradlee, Northampton | 249 questions, 204 references |
| Mr. J. Coryell, North Easton | 189 questions, 207 references |
| Mr. A. W. Doolittle, Concord | 321 questions, 841 references |
| Mr. J. H. Fay, Northborough | 402 questions, 349 references |
| Mr. J. G. Powers, North Easton | 566 questions, 514 references |
| Mr. Milton S. Rose, Harwich | 357 questions, 870 references |

### 2. Vegetable Growing Project Study Outlines

In project study outline making, the agricultural instructor must weigh, balance, and determine many practical and scientific matters. What number of vegetables may a first or second year boy safely

FIG. 81. — Village boy's back yard before studying agriculture in 1914. See Fig. 82.

undertake to grow? How, and in what order, should the vegetables he grows be studied? These problems are dealt with in the following discussion.

(1) **Project study and vegetable groups. A. Possible classifications.** — A careful study of the botanical characteristics, uses,

and methods of cultivation of any considerable number of varieties of vegetables will disclose the fact that vegetables naturally fall into different groups, each distinct in important respects from others.

Vegetables have been classified by their food parts under such headings as the following: "Roots we eat," "Leaves we eat," "Seeds and seed pods we eat." To these three groups might be added, "Plants we grow for garnishes."

Vegetables have been classified, also, according to the date of planting or earliness of maturity in the open, as, "first early," "second early," "third early," "fourth early," or "late."

Again, vegetables have been classified according to certain botanical characteristics. Under this classification "early" and "late" vegetables may be found in the same group; also, vegetables in a given

FIG. 82. — Same boy's back yard while studying agriculture in 1914. Had ½ acre in vegetables on other land. Now a student at Massachusetts Agricultural College. North Easton Agricultural Department.

group, as, for example, those of the parsnip family (*Umbelliferæ*), may differ radically as to their food parts, and run from roots we eat to edible leaves and seeds. The parsnip family includes even the

most important garnish plant. Our garden herbs and vegetables belong to at least seventeen plant families.

**B. Possible varieties.** — The following varieties of vegetables were found to have been successfully grown in Massachusetts home gardens, and are among those which in this state are suitable for project work and related study. The arrangement is alphabetic, and throws no light upon choice of preferred varieties where two or more varieties are given.

**Asparagus:**
Giant Argenteuil.
Palmetto.

**Beans, green:**
Bountiful.
Burpee's Stringless.
Burpee's Stringless Green-pod.
Early Red Valentine.

**Beans, pole:**
Arlington Red Cranberry.
Dreer's Improved Pole Lima.

**Beans, shell:**
Dwarf Horticultural.

**Beans, wax:**
Golden Queen Wax.
Refugee.
Wardwell's Kidney Wax.

**Beets:**
Crosby Egyptian.
Detroit Dark Red.
Eclipse.
Edmand's.

**Cabbage:**
All Seasons.
Curled Savoy.
Danish Ballhead.
Jersey Wakefield.

**Carrot:**
Danvers Half Long.

**Cauliflower:**
Snowball.
Dwarf Erfurt

**Celery:**
Giant Pascal.
Paris Golden.

**Corn:**
Cory.
Country Gentleman.
Golden Bantam.
Quincy Market.
Stowell's Evergreen.

**Cucumber:**
Arlington White Spine.
Davis Perfect.

**Dandelion:**
Improved French Thick leaved.

**Eggplant:**
Black Beauty.
New York Improved.

**Endive:**
Broad-leaved Batavian.
Green Curled.

**Kohl-rabi:**
Early White Vienna.

**Leek:**
Carentan.

**Lettuce:**
Black Seeded Simpson.
Black Seeded Tennis Ball or Big Boston.
Deacon.
Salamander.

**Muskmelon:**
Emerald Gem.

Miller's Cream.
Rocky Ford.

**Onions**:
Yellow Globe Danvers.

**Parsley**:
Arlington Double Curled.

**Parsnips**:
Abbott Hollow Crown.

**Peas**:
Gradus.
Gregory's Excelsior.
Surprise.
Telephone.

**Pepper**:
Ruby King.
Sweet Mountain.

**Potatoes**:
Green Mountain.
Irish Cobbler.

**Radish**:
Early Scarlet Globe.
French Breakfast.

**Rhubarb**:
Linnæus.
Victoria.

**Salsify**:
Mammoth Sandwich Island.

**Spinach**:
Long Standing.
Round Thick Leaf.
Savoy-leaved.

**Squash**:
Crookneck.
Early Prolific Marrow.
Hubbard.

**Tomato**:
Bonny Best.
Chalk's Early Jewel.
Earliana.
Stone.

**Turnip**:
American Rutabaga.
Early Milan.
White Egg.

**C. Classification by methods of cultivation.** — The following classification of the foregoing varieties of vegetables is based on essential methods of cultivation and will probably best serve the purposes of project study.[1]

**Class I. Annual Vegetables.**
**Sub-class I. Crops grown for Subterranean Parts.**
**Group 1. Root Crops.**
Beet, *Beta vulgaris*.
Carrot, *Daucus carota*.
Parsnip, *Pastinaca sativa*.
Radish, *Raphanus sativus*.
Salsify, *Tragopogon porrifolius*.
Turnip and rutabaga, *Brassica*.
**Group 2. Tuber Crops.**
Potato, *Solanum tuberosum*.

[1] The outlines of this classification had been proposed a decade before in "Principles of Vegetable Gardening," pp. 240–242, by Prof. L. H. Bailey, and had been followed in one of the latest studies of the subject, "Vegetable Gardening," 1912, pp. 196–199, by Prof. R. L. Watts.

**Group 3. Bulb Crops.**
Onion, *Allium Cepa, A. fistulosum.*
Leek, *A. Porrum.*

**Sub-class II. Crops grown for Foliage Parts.**

**Group 4. Cole Crops.**
Cabbage, *B. oleracea.*
Cauliflower, *B. oleracea.*
Kohl-rabi, *B. oleracea.*

**Group 5. Pot-herb Crops (used for " Greens ").**
Spinach, *Spinacea deracea.*
Beet, *Beta vulgaris.*
Dandelion, *Taraxacum officinale.*[1]

**Group 6. Salad Crops.**
Lettuce, *Lactuca sativa.*
Endive, *Cichorium Endivia.*
Celery, *Apium graveolens.*
Parsley, *Carum Petroselinum.*

**Sub-class III. Crops grown for Fruit or Seed Parts.**

**Group 7. Pulse Crops.**
Bean, *Phaseolus, Dolichos, Vicia.*
Pea, *Pisum sativum.*

**Group 8. Solanaceous Crops.**
Tomato, *Lycopersicum esculentum.*
Eggplant, *Solanum Melongena.*
Pepper, *Capsicum annuum.*

**Group 9. Cucurbitous or Vine Crops.**
Cucumber, *Cucumis sativus.*
Melon, *C. Melo.*
Squash, *Cucurbita.*

**Group 10. Corn.**
Sweet corn, *Zea Mays.*

**Class II. Perennial Vegetables.**
Asparagus, *Asparagus officinalis.*
Rhubarb, *Rheum Rhaponticum.*

**D. Varieties of vegetables per pupil. (A) Desirable range.** — Glancing over the above list B and classification C, embracing some seventy-five varieties and eleven groups, it appeared to be desirable that each boy should grow and study at least one variety from each

[1] This is a perennial, but when grown in a garden does not occupy a given piece of ground more than a year.

group. The least number of varieties dealt with would then be eleven; and, within certain groups, would permit of a considerable range of choice to suit the tastes of the boy or the likings of his family.

FIG. 83. — Wilson Walker, 16. "Improvement" project and "productive" project combined. Grandfather agreed to give him use of this field for vegetable growing if he would clear it of rock. Sold 240 tons to city crusher. Got cash enough to pay for team work and dynamite. See Fig. 84.

**(B) Surplus for sale.** — To test his results by the strictest commercial standards, each boy, in addition to growing certain varieties of vegetables in sufficient quantity to supply the summer and winter needs of his family, it was believed should be encouraged, if not required, to grow at least one variety on such an extended scale as to yield a surplus for sale. If his family were in modest circumstances, and could only allow him credit at current prices for vegetables produced for home use, his surplus might make his biggest crop his only cash crop. It cannot be doubted that the prospect of cash returns has been a most powerful incentive to competent, persistent, and intelligent project work and project study.

FIG. 84. — Part of same field shown in Fig. 83 same year. Spraying potatoes. Carrots and other vegetables on rest of field. Paid himself for labor, at 20¢ an hour, $93.90. Net profit, $140.11. Total project returns, $244.01. Entire earnings from this and other farm work in 1914, while doing excellent work in high school, $337.11. Marlborough Agricultural Department.

(C) **Experience as a guide.** — Of course there is great variation in capacity for fruitful study and competent garden work; but even children under fourteen have successfully produced in school garden work more than a half-dozen varieties of vegetables; and boys of secondary school age, when giving only part of their time to such work, have produced, with clean culture and profitable results, fully twice as many.

FIG. 85. — Part of Wilson Walker's field the same year it was cleared of rock, planted to market garden vegetables, carrots, parsnips, etc. See Figs. 83, 84, and 86.

(D) **Judgment of the instructor.** — It is evident that the number of varieties per pupil must be left to the instructor. He must exercise his best judgment in approving the number, as well as the sorts, of vegetables to be grown.[1]

Where individuals have little or no preference as to the variety within a given group, one pupil may be assigned one variety, other pupils the other varieties. Where there is school land, varieties not chosen for home growing may be grown at the school. Thus the work, study, and observation by the whole class may be made to cover nearly, if not completely, each entire group.

The six-variety boy should not be permitted to undertake twelve

[1] Mr. J. H. Fay, a teacher of experience in project instruction and home work supervision, thus summarized the situation as he saw it:

"1. The varieties to be chosen should be adapted to the soil, exposure and location of land on the farm.

"2. The varieties should be those most easily grown with success.

"3. Use varieties serving the most useful economic and instructive purposes.

"4. Use those sorts best suited for local sale or home consumption.

"5. Aim to have the boy's home gardening supplement and improve the present kitchen garden; or where such does not exist, or is very inferior, make it of such a nature that its value will be realized and permanency secured.

"6. If field projects of a commercial nature are the ones in view, then local conditions as to soil, markets, etc., will again determine the varieties to be selected."

varieties, nor should the boy capable of completing a twelve or fifteen variety project be permitted to stop short at a six.

(2) **Project study by vegetable groups. A. A practical approach.** — Since productive work on the home farms of the pupils is such a fundamental feature of the project plan, there are obvious advantages in the above classification of vegetables by methods of cultivation.

**B. Aid to garden planning.** — Familiarity with the general cultural requirements of the various groups is necessary to the first intelligent

FIG. 86. — Harvesting cabbages and other bulky vegetables. Wilson Walker at right; at left, his brother whom he hired to help him. Wilson is now "in the trenches." "To farm is to arm," but he felt he must respond to the call to the colors on the field of battle. Marlborough High Agricultural Department.

steps in home-garden planning. These requirements are given by various authorities, and with them, of course, the agricultural instructor must be familiar. The following notes are from Professor Bailey's "Principles of Vegetable Gardening," pp. 271–433: .

**Group 1. Root Crops** require a cool season and deep soil. They are grown in drills, and usually are not transplanted. They are used both as main-season and secondary crops. All are hardy. No special skill is required in growing them.

The necessity of deep soil is apparent when one considers that the value of a root depends to a large extent on its straightness or symmetry. In hard and shallow soils roots are short and they tend to be branched and irregular.

Fine tilth does much to insure quick growth, and quick growth improves the quality.

**Group 2. Tuber Crops. The Potato.** — Deeply pulverized, cool soil, holding much capillary moisture and rich in potash, deep and early planting, level culture, frequent surface tillage to conserve moisture, spraying to insure healthy foliage, — these are requisites of the best potato culture. The potato is propagated by means of tubers. It thrives best in a relatively cool climate; in the south, it is successful only as a spring and fall crop, for the midsummer season is too continuously hot.

In most cases a heavy yield of potatoes is largely a question of moisture.

**Group 3. Bulb Crops.** — All the bulb crops are hardy, require a cool season, and moist, rich soil, with a loose surface. Usually they are not seed-bed crops. They are used both as main-season and secondary crops. They are propagated by both seeds and bulbs. These crops are grown chiefly for the underground bulbs (but the leaves are often used in stews and seasonings).

FIG. 87. — Farm boy. Le Roy Anderson, 15. One acre gardening project at home. Far from market. Grew bulky crops. Head of cabbage ready for sale. Walks five miles to school. Uses bicycle part of year. One of boys referred to by Dr. Lyman Abbott on p. 459 as putting high estimate on education.

**Group 4. Cole Crops.** — All cole crops are hardy and demand a cool season and soil and abundance of moisture at the root. Except the kales and kohlrabi, all are seed-bed crops, and even kales are often started in beds. Each plant requires considerable space in order to develop well. Cole crops are grown for the vegetative aërial parts rather than for fruits or roots.

**Group 5. Pot-herb Crops.** — Pot-herb crops, or "greens," are grown for their leaves: therefore they must make quick growth in order to be crisp and tender; the ground must have good surface tilth and much available plant food; the application of soluble nitrogenous substances is usually important, particularly when the growth is nearing completion. Most pot-herb crops demand a cool season; and nearly all of them are partial-season crops, and are therefore treated as succession or companion crops.

**Group 6. Salad Crops.** — As a general statement, it may be said that

salad plants require cool, moist soil, and a quick, continuous growth if the best results are attained. They are often benefited by a special application of quickly available fertilizers during growth, particularly of nitrogen in those species which are desired chiefly for a quick growth of leaves.

**Group 7. Pulse Crops.** — Botanically peas and beans are very closely related, but they have few points in common from the cultural point of view, since peas are hardy, cool-season plants and beans are tender, warm-season

FIG. 88. — Part of squash crop of Le Roy Anderson. Rest sold at date of picture. Project income (his labor plus net profit), $156.82. Entire farm earnings for this year (1914) amounted to $336.27. Excellent worker and stood well in school. Graduated. Now farming with his father. Ashfield Agricultural Department.

plants. Both are leguminous crops, and are therefore capable of using atmospheric nitrogen. As garden crops, however, they may need applications of nitrogen in order to secure a quick start, particularly if an early crop is desired. "It is frequently the wiser economy to apply nitrogen, particularly if they are raised upon land which has not been previously planted with these crops, and thus may not possess the specific nitrogen-gathering bacteria." (Voorhees.)

*Peas.* — Peas are a partial-season crop, requiring cool season and a soil not over rich; seed is sown where the plants are to stand; grown in drills; hardy.

**Beans.** — Garden beans represent several species, but all the common kinds are very tender to frost and require a warm season and sunny exposure; seed is sown where the plants are to grow; usually grown in drills, except the tall kinds; the common bush beans are partial-season plants.

**Group 8. Solanaceous Crops.** — Tomatoes, eggplants, and their kin are hot-season plants. They require nearly or quite the entire season in which to

FIG. 89. — Alden Wheeler, 16, had home project on this farm. Sign erected after Alden's father had contracted to supply Marston's restaurants with sweet corn and had planted 40 acres to this crop alone. Winter storage for 100 tons of Hubbard squashes. Much space under glass for cucumbers, etc. Concord Agricultural Department.

mature. Usually they grow until killed by frost, at least in the north, and the production of a heavy crop depends largely on securing an early start. They are seed-bed crops, and they need abundance of quick-acting fertilizers applied relatively early in their growth. They are grown in hills.

**Group 9. Cucurbitous or Vine Crops.** — Cucurbitous crops are annuals, grown for their fruits; they are tender to frost; they require a warm season and a full exposure to sun; they are long-season crops, and with most of them a quick start is essential in order that they may mature the crop before fall; they are grown in hills, as a main crop; they are planted in the field or in frames, depending on the region and the period at which the crop is wanted;

they transplant with difficulty, and if the plants are started in advance of the season they are grown in pots, boxes, or on sods.

**Group 10. Corn.** (Other names omitted.) — The plants here mentioned are all warm-weather crops; they are annuals or grown as such, and they are cultivated for their immature fruits; they should have quick soil; usually they are not transplanted; other than good tillage, no special treatment is required.

**Group 11. Perennial Crops.** — The management of perennial crops differs from that of other vegetable-gardening crops, in the fact that they are

FIG. 90. — Selecting strawberry plants for a new bed. Home projects in gardening should include small fruit growing. Brimfield Agricultural Department.

more or less permanent occupants of the ground, and therefore must be given an area to themselves, where they will not interfere with the customary plowing and tilling, in the fact that the chief tillage and care are required early and late in the season, and also because the fertilizing is secured chiefly by surface dressings in spring and fall.

**C. Good but inadequate.** — This knowledge of the cultural requirements by groups above given affords a practical approach to vegetable gardening. It probably will enable a boy to decide what groups are suitable for his land, and, therefore, what he may hope to grow

for his family or cash crop. It may, consequently, be sufficient foundation for the boy's preliminary garden sketch. A careful examination shows, however, that almost everything is yet to be learned as to the individual cultural requirements of the vegetables which the boy selects for his project work.

Accordingly, only so much time should be given to the study of vegetable groups as may be necessary for reasonably intelligent selection

FIG. 91. — This boy's father bought this farm, because a real estate agent told him there was an agricultural department in the high school, that his son could take the agricultural course, and that the instructor would advise him (former N. Y. City man) when invited to do so. Petersham Agricultural Department.

of the varieties which are to be grown. In fact, so much knowledge may well be to a large extent a gift from the instructor to the class as a whole.

### (3) Project study by vegetable varieties

Thoroughgoing project study begins when the individual pupils settle down to the study of the particular vegetables which each has decided he prefers to produce. Such study necessitates the formulation of project study outlines for the chosen vegetables.

It probably will always be the case that a considerable number of varieties will be selected by the entire class, while other varieties will

be selected by but part of the class, perhaps by but a single pupil. Project study would better begin with those varieties with which all are to work. The outline making should, therefore, begin with those varieties which are to be grown by all. Outlines for the remaining varieties may then be made.

Elsewhere [1] a project dealing with a staple vegetable, sometimes grown in the garden and grown sometimes as a field crop, has been analyzed for the purpose of showing the character and extent of the project study pertinent to a single crop.

Two examples of project study outlines will here be given. These will show project study materials organized for classroom and

FIG. 92. — First-year projects include ornamental planting and care. Creating beauty spot rear of school. Back yards, as well as front, receive attention. Bit of landscape forestry. Ashfield Agricultural Department.

individual instruction, in connection with home gardening projects. The first outline determines the precise object of the project; its scope, whether modest or more ambitious; and the things to be done in general preparation of the land, etc. The second deals with a particular vegetable. Moreover, since the vegetable elsewhere analyzed is a staple article of food, namely, the potato, the vegetable here chosen is a salad plant.

Lettuce, the vegetable selected for the second outline, might serve, it will be seen, a most excellent purpose for introducing the study of

[1] Chapter II, pp. 44–50.

vegetable growing. Here are some of its advantages for such study: it is an attractive home crop and a very important cash crop. It may be grown in the house, in a hotbed, cold frame or greenhouse, or in the open; among the earliest vegetables, among the latest and for a continuous summer supply; or to keep the land busy as a companion or succession crop in connection with other vegetables. It teaches the importance of abundant feeding and watering as fundamental to both quantity and quality. It naturally singles out for study one of the most important elements of plant food. Since in connection with

FIG. 93. — School flower garden sometimes aid to home flower garden. Cut flowers sent into hospital next door and taken home by pupils. Smith School, Northampton.

it the first labor is likely to be performed, the first seeds, fertilizers, and tools used, and the first product disposed of to the family for credit or to the public for cash, it is one of the best vegetables for initiating the keeping of records and accounts.

It will be seen that these outlines overlap slightly at certain points. The wise instructor will make a point of such overlapping in his outline making. He will find therein fruitful opportunities for reviewing important elements of both principle and practice. As aids to similar reviewing, references will be found to the approved textbooks used by the pupils in their " agricultural survey " instruction.

If, at first glance, it should be feared that the second outline is too full, it should be understood that no pupil is expected to look up every reference under every question. Further, it should be understood that certain questions of agricultural science which a given instructor intends to treat in connection with the growing of other vegetables may, at that instructor's discretion, be omitted or touched upon but lightly in connection with lettuce. The effort here is to show a good

FIG. 94. — Agricultural class potting plants for schoolrooms of all classes. Getting ready for winter. Using dirt from hotbeds. Both beauty and utility in the Massachusetts plan. School projects are preparatory to home projects here as everywhere. Petersham Agricultural Department.

form of outline for use, not only by a whole class in any given school or department, but by all classes throughout an entire state vocational agricultural education service like that in Massachusetts.

Matter suggested as desirable, particularly for the study of the most capable pupil, under the heading " Broader Results," in Fig. 56, page 70, in Chapter III, has been dealt with in the following outlines in footnotes. Such questions as those in the footnotes may be omitted by all save the most exceptional pupils.

The first outline immediately follows; the second begins on page 126.[1] The open spacing will be noticed. Outlines in this skeleton form invite additions from time to time, make revisions easy; and, particularly, make outlines suited to one locality quickly adaptable to another locality.

[1] For explanation of the numbers in heavy faced, and in lighter faced type, see above, page 100, last paragraph.

## (4) Suggestive project study outline — Kitchen gardening

**Project: Kitchen gardening**

OBJECT, SCALE, AND FIRST STEPS OF PROJECT

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 1. **Shall you grow vegetables?** [1] | (1) What are the advantages of a good home garden?<br>**1**: 187–188 **5**: 325 **13**: 5–6 **16**: 3–6, 8, 11<br>**25**: 335. **27**: 10, 12–16 **39**: 3, 490 **40**: 1 ff.<br>(2) Could you sell part or all of your product outside the family? |
| 2. **Where shall you grow them?** | (1) Where was the home garden last year?<br>A. How well did the vegetables grow in it?<br>B. Was it large enough to supply the family, or were such vegetables as winter squashes and potatoes grown as field crops?<br>(2) May it be desirable to change the location of a garden, or of the place of growing certain vegetables in an old garden?<br>A. What is "rotation," and its significance for vegetable growing?<br>**26**: 13 **39**: 493 **276**: 32–34<br>(3) Which way should the garden slope?<br>**26**: 7<br>(4) What soil is best for a garden? [2]<br>**1**: 188–189 **26**: 7–8 **27**: 22<br>**39**: 19, 21 f., 25–26, 27<br>(5) May the garden vegetables be part of a field crop? How? Advantage?<br>**1**: 188<br>(6) Is protection from the wind important? Why?<br>**39**: 14<br>(7) Is good drainage a necessity? Why?<br>**1**: 189 **5**: 91–92 **13**: 9 **39**: 26<br>(8) On the whole, what may be considered the best location for a garden?<br>**1**: 188 **5**: 235 **11**: 451 **13**: 6 **27**: 20<br>**39**: 12–14, 491, 492–493 |

[1] What is "olericulture"? **39**: 1 **276**: 1–6.

[2] What do you know about "portable soil" and renting contracts among small gardeners near Paris? **874**: 54.

## Kitchen gardening — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 2. Where shall you grow them? — *Continued.* | (9) Shall you grow vegetables under glass? [1]<br>A. What are "hotbeds" and "cold-frames" for? Cost of construction and operation?<br>**5**: 236–237 **11**: 483 **13**: 12–15 **25**: 145<br>**39**: 355–356 **276**: 44–79 **747**: 250–253<br>**876**: 94–96<br>B. Shall you use a hotbed? How?<br>a. What is the best manure for a hotbed?<br>**26**: 67–68 **27**: 65 **39**: 109–110 **276**: 56<br>b. How shall you manage the manure to insure heating?<br>(*a*) What makes manure heat?<br>**26**: 67 **27**: 65 **275**: 56<br>(*b*) How pile it? **27**: 65<br>(*c*) How moist should it be?<br>**275**: 56–57<br>(*d*) What may be the result of careless watering?<br>**275**: 61<br>(*e*) How shall you get uniform heating?<br>**27**: 65 **276**: 57<br>(*f*) What shall you do, if the manure fails to heat?<br>**27**: 56<br>c. How thick should be the layer of manure, and ho thick the layer of soil? What consideration should be given the kind of crop, in answering the foregoing question?<br>**275**: 60<br>d. How soon after making will the hotbed be ready to receive the seed?<br>**276**: 61–62<br>e. Meantime, what treatment does the seed bed require?<br>**26**: 58 **275**: 61–62<br>C. Shall you use a "cold frame"? How?<br>(10) In view of the above, where shall you grow your vegetables? |

[1] Open air *v.* hothouse returns, according to 12th census? **853**: 194.

## Kitchen gardening — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| **3. What kinds shall you grow?** | (1) Shall you grow both hardy and tender vegetables?<br>A. What are "hardy" and "tender"?<br>753 : 159<br>(2) What is a practical way of grouping vegetables by their cultivation requirements?<br>39 : 196–200, 241<br>276 : 240–242, 271, 301, 314, 329, 347, 356, 380, 392, 411, 423, 429, 433<br>(3) What kinds are liked best by your family?<br>(4) What kind could you sell best?<br>(5) What kinds or varieties, therefore, shall you grow for<br>A. Family use?<br>a. Summer?<br>b. Winter?<br>B. Sale? |
| **4. What quantities shall you grow?** | (1) To what extent shall you undertake to supply your family with the vegetables needed for the entire year? [1]<br>A. What kinds of vegetables were used on the home table last year?<br>B. What quantity of each was required?<br>C. What were grown at home and what were purchased?<br>D. About what was the total value of the vegetables used in the last twelve months by your family?<br>E. Shall you work alone or in coöperation with some of your family, a neighbor, or a fellow pupil?<br>16 : 9–10 |

[1] What may comparatively small areas produce under the best methods? 5 : 234
13 : 5 33 : 9–17 276 : 31, 35 853 : 69–109, 118–121, 123, 127, 407–408.

## Kitchen gardening — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| **4. What quantities shall you grow?** — *Continued.* | (1) To what extent shall you undertake to supply your family with the vegetables needed for the entire year? — *Continued.*<br>F. How large was the garden last year? Sketch outline, give dimensions, and figure area.<br>G. How large a garden will supply a family of five or six?<br>**11**: 454–455 **276**: 31, 35–43<br>H. In view of the foregoing study, and assuming that a garden should be cultivated carefully about twice a week for the family supply, how large an area shall you undertake to work?<br>(2) Shall you grow a surplus for sale?<br>A. What quantity could be readily sold?<br>B. What would be the cost of marketing?<br>C. In view of the above, what quantity shall you try to produce for sale, and what land allowance shall you make? |
| **5. Shall you map your garden?** | (1) Advantages of, and materials for making a garden plan?<br>**25**: 8, 24–28, 42 **27**: 21, 23, 25 **271**: 279–284<br>**753**: 324 **876**: 61<br>A. What scale shall you use?<br>a. What is "drawing to scale"?<br>B. Shall you show the points of compass? Why?<br>**876**: 61<br>C. Which way shall the rows run, lengthwise or crosswise?<br>**276**: 31–32<br>D. Shall the rows run north and south? Why?<br>**25**: 8–11<br>E. Shall your plan show such double cropping as you have decided upon?<br>a. What is "double cropping"?<br>**39**: 475–489<br>F. In what part of the garden shall you put low-growing, and in what part high-growing plants?<br>G. Shall you observe strictly the rules of "rotation" in locating your deep and shallow rooted plants?<br>H. What are some model kitchen garden plans?<br>**11**: 8–9, 451–454 **13**: 7–8 **16**: 2–28<br>**25**: 11–14 **27**: 21, 23, 25 **31**: 20–21<br>**276**: 33, 37, 39, 41 |

## Kitchen gardening — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 6. **When, and how thoroughly, shall you prepare your land?** | (1) What time of year is best for plowing land for gardening?<br>**26**: 31 **39**: 29 **276**: 88<br>A. What may be gained by fall plowing?<br>**26**: 31 **39**: 29, 30 **254**: 40, 41 **276**: 88–89<br>(2) What is the relation of a thoroughly pulverized seed bed to quick germination and rapid growth? Best tools to use? Best methods of using them?<br>**1**: 74–76, 83–87, 96, 190 **11**: 87–114<br>**13**: 9–10, 15, 21–22 **24**: XIX **25**; 35–42<br>**39**: 28–40 **276**: 155 **278**: 91–130<br>**279**: 390–392 **285**: 90–92, 156–158 **767**: 67–72<br>**770**: 5–6 **876**: 77–78, 88–89<br>A. What tools shall you use?<br>a. What have you now? Make a list.<br>b. What must you buy? Make a list.<br>B. What will be your expense for these tools? |
| 7. **Shall you use lime?** | (1) Shall you use lime on your vegetable land?<br>A. What is the effect of lime upon the soil?<br>**279**: 304–307<br>B. Effect upon the plant?<br>**279**: 302–304<br>C. When most beneficial?<br>**279**: 307–309<br>D. How can you tell when lime is needed?<br>**5**: 126 **25**: 7 **39**: 65–66 **279**: 309–310<br>**752**: 98 **767**: 95–99 **770**: 46–50<br>E. When, in what forms, and how may lime be applied?<br>**5**: 127–128 **278**: 70 **279**: 302–311, 314<br>F. Where shall you get your lime, and what will it cost? |
| 8. **How and when shall you fertilize your land?**[1] | (1) Shall you use stable manure?<br>A. Value of stable manure in vegetable growing? Should it be well rotted? Apply when and how much?<br>B. How should stable manure be stored and handled?<br>C. Should it be thoroughly mixed with the soil? Plowed or spaded under? Or raked, or harrowed in? |

[1] What are motives for fair and square treatment of the land? **1**: 100 **876**: 57–58.

## Kitchen gardening — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 8. How and when shall you fertilize your land? — *Continued.* | **1**: 97–100, 188 **13**: 11 **16**: 30–31, 33–35<br>**24**: XVII **25**: 4, 5, 7, 112 **27**: 35–38<br>**39**: 41–42, 49–50, 492 **271**: 275 **285**: 173–181<br>**616**: 5–32, esp. 16–29 **697**: 113–181<br>**876**: 56–57<br>D. What will your manure cost?<br>(2) Shall you use green manure?<br>A. What is "green manuring"? What are its advantages and disadvantages?<br>**1**: 100 **25**: 16–17 **39**: 53–57<br>**279**: 349–370, esp. 349, 370<br>**285**: 171, 183, 185, 186, 188, 189, 191 **876**: 58–59<br>(3) Shall you use compost?<br>A. What is "humus"? What does it do?<br>**5**: 95–96 **25**: 4, 7, 8, 61, 246, 247, 274, 299, 306<br>**27**: 22 **278**: 25–26, 31, 35, 67<br>**285**: 27, 38, 41, 43, 44, 62, 67 **752**: 108–109<br>**767**: 33, 38, 48, 51<br>B. What is "compost"? How made?<br>**25**: 17, 18, 34, 61, 112, 113, 152, 306 **26**: 21<br>**278**: 242, 243 **285**: 171, 181 **876**: 59–60<br>C. What is "short" manure? Should stable manure be composted?<br>**24**: XVIII **27**: 36–38 **39**: 47–49<br>**276**: 95–96<br>D. What will your compost cost?<br>(4) Shall you use commercial fertilizer?<br>A. Most lands usually contain sufficient quantities of all save what elements of plant food?<br>**11**: 111<br>B. What is "commercial fertilizer"? Its uses and its sources?<br>**1**: 97–98 **5**: 114–125, 131, 132, 408 **13**: 11–12<br>**24**: XX **25**: 6, 32–35, 58–71 **39**: 58–65<br>C. What may be considered an "all-round" fertilizer, or a "basic mixture," for vegetable growing?<br>**25**: 33 **276**: 104–106 **633**: 267 |

## Kitchen gardening — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| **8. How and when shall you fertilize your land?** — *Continued.* | a. Shall you use a basic or all-round mixture?<br>b. If so, what will it cost?<br>D. Shall you use commercial fertilizers separately, and not mixed?<br>a. Do certain vegetables prefer particular fertilizers, as, for example, celery, beets, peas, lettuce, cabbages, and tomatoes?<br>**5**: 116–123 **25**: 146 **26**: 225<br>**39**: 235, 250, 270, 312, 356, 411–412, 458–460 **276**: 359<br>**409**: 64 **633**: 277<br>b. What shall you spend for commercial fertilizers? |
| **9. Plant how?** | (1) What are the relative advantages of planting by hand, and with a planter or seed sower?<br>**11**: 117 **16**: 94 **24**: xiii, xiv, xix–xx<br>**25**: 54 **39**: 135, 137 **276**: 163–164<br>A. Shall you use a planter or seed sower?<br>B. What will it cost you? |
| **10. Cultivate how?** | (1) What is the relation of "clean culture," and preservation of a thin "earth mulch" to quality and quantity of vegetables? And shall you use horse or hand tools?<br>**11**: 95–96, 101–107 **13**: 21 **16**: 96–103<br>**25**: 31–32, 35–37, 38 **27**: 18, 52–56, 157–159<br>**39**: 358 **276**: 360 **853**: 112–113 **874**: 76–81<br>A. Are weeds ever beneficial? What are weeds? What better "cover crops" are there?<br>**409**: 88 **768**: 71–73<br>B. Should care be exercised in weeding and cultivating?<br>**25**: 37–38<br>(2) What tools shall you use for cultivating?[1]<br>(3) What will these tools cost?<br>Compare **25**: 32, 36, 37 |
| **11. How gather, care for, and dispose of product?** | (1) The questions as to tools, receptacles, etc., required for gathering and disposing of the garden vegetables can be better answered after the individual varieties to be grown have been studied. |

[1] What do you know about the history and kinds of tillage tools? **5**: 82–94 **25**: 31–32 **271**: 81.

## Kitchen gardening — Concluded

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 11. How gather, care for, and dispose of product? —*Continued.* | (2) What means of storage have you, or shall you provide? [1]<br>**11**: 158–161, 475 **25**: 113–119 **39**: 193–195<br>**274**: 141, 142, 146, 147, 149 **276**: 214, 224–235<br>**753**: 162–163 **767**: 31–33, 48–79, 80, 81, 86, 87, 109<br>(3) What salesmanship principles as to attractiveness of person and products, advertising, etc., shall you put into practice in selling your surplus?<br>**5**: 380–383 **39**: 162–192 **276**: 214–224<br>**753**: 327–328 **761**: 154–160<br>**850**: 33, 35, 41, 42, 69, 72, 74, 77, 79, 87, 88, 92 |
| 12. What accounts shall you keep of your gardening project? | (1) What are proper elements of cost and the best methods of accounting in vegetable production?<br>**5**: 380–383 **39**: 162–163 **276**: 214–224<br>**465**: 109–138, 139–144, 145–197 **492**: 1–21, 22–41, 82–100<br>**753**: 327–328 **761**: 154–160 **782**: 157, 159<br>(2) What account with your family shall you keep?<br>**492**: 143–152 |

## (5) Suggestive project study outune. — Lettuce growing

**Project : Kitchen gardening**

**Sub-project : Lettuce growing**

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 1. Plant where? | (1) Where have you seen good lettuce growing? Of whom may you seek advice? [2]<br>**31**: 15<br>A. Lettuce belongs to what cultural class, and what are the soil requirements of that class?<br>**276**: 241<br>B. What soil is best for lettuce?<br>**39**: 355 **276**: 356, 358–359 **874**: 119 |

[1] What do you know about the canning and preserving of vegetables? **271**: 157–177.

[2] Origin and importance of lettuce? **11**: 483 **25**: 149 **38**: 361 **39**: 351 **276**: 360. Botanical features and classification? **26**: 223 **276**: 360–361 **285**: 85–86.

## Lettuce growing — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 1. Plant where? — *Continued.* | (1) Where have you seen good lettuce growing? Of whom may you seek advice? — *Continued.*<br>C. At what spot are your soil conditions best for lettuce? How best?<br>**874** : 54–55<br>(2) Shall you grow lettuce in more than one part of the garden? [1]<br>A. What is companion cropping?<br>**39** : 357–358, 477, 478, 480, 482, 488 **276** : 358<br>**747** : 257<br>B. What is succession cropping?<br>**1** : 189 **25** : 13 **31** : 22–23 **271** : 105<br>**276** : 358–359 **853** : 191–192, 330 **876** : 119<br>C. In view of the above references, what combinations might you make?<br>D. What combinations shall you make?<br>(3) Where shall you start your plants?<br>A. In the house?<br>**1** : 190 **25** : 63–68, 145 **26** : 47 **285** : 51<br>**767** : 212 **876** : 92–93, 119<br>B. Under glass? [2]<br>a. What is a cold frame? A hotbed?<br>**5** : 236–237 **11** : 483 **25** : 145 **39** : 355–356<br>**276** : 44–79 **747** : 250–253 **876** : 94–96<br>C. How much time may be gained by starting plants indoors or under glass?<br>**25** : 51–52 **31** : 113 **39** : 355 **276** : 49<br>(4) How large an area needed? [3]<br>A. In the garden?<br>a. Plants per acre?<br>**851** : 329<br>b. How may thinnings be used? Relations of such use to area required?<br>**11** : 483 **24** : 152 **25** : 146 **31** : 33<br>**276** : 359 **876** : 91<br>c. Your estimate of area needed? |

[1] Possible returns from double croppings? **853**: 329–331.

[2] What do you know of experimental lettuce growing and its production under glass by market gardeners? **271**: 23–26, 30, 33, 120, 122 **747**: 248–250 **876**: 93.

[3] Heads per acre and possible profit? **31**: 114 **39**: 358.

## Lettuce growing — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| **1. Plant where?** — *Continued.* | (4) How large an area needed? — *Continued.*<br>B. Under glass?<br>a. What is a "sash"?<br>**276**: 46<br>b. What is a "frame"?<br>**276**: 46<br>c. Number of lettuce plants per sash?<br>**31**: 113–114 **276**: 46<br>d. Your estimate of space needed under glass? |
| **2. Plant what?** | (1) What varieties have you seen or eaten? [1]<br>(2) What variety is best liked by the family?<br>(3) What variety sells best where you might sell your surplus?<br>(4) Is there a better all-round variety than Black Seeded Tennis Ball? Why?<br>**11**: 484 **25**: 50, 130, 131, 144–145, 147<br>**26**: 225–226 **31**: 24, 33, 113 **39**: 351–354<br>**276**: 358 **292**: 557–558 **876**: 119<br>(5) What is your estimate of the quantity of seed needed?<br>**11**: 484 **26**: 46 **39**: 495 |
| **3. Plant when?** | (1) What is a "planting table"?<br>**25**: 327–334, esp. 331 **274**: 106<br>(2) How long does it take lettuce to mature for table use?<br>**25**: 149 **31**: 33, 113<br>(3) How early and how late may lettuce be planted?<br>**25**: 144, 146, 149 **26**: 223–225 **31**: 21–22<br>**33**: 113–114 **39**: 357–358<br>(4) Should supply be sought for hot months?<br>**1**: 191 **11**: 484 **25**: 147–148 **39**: 354<br>**276**: 357–359<br>(5) What is "pricking out" and how is it done?<br>**24**: xxii–xxiii **25**: 145–146 **876**: 94<br>(6) Does transplanting aid heading? Why?<br>**31**: 114 |

[1] What are some estimates of the number of known varieties of lettuce? **276**: 361.

## Lettuce growing — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 4. **Seed, get when and where?** | (1) Shall you use home-grown or purchased seed? [1]<br>(2) Shall you grow your own seed for next year?<br>**26**: 51 **276**: 165–168 **292**: 179<br>A. Pound of seed from how many plants?<br>**39**: 355<br>B. What is the appearance of lettuce seed as to size, shape, surface, and color or colors?<br>**25**: 149 **38**: 361<br>(3) Shall you get your seed early and test it?<br>**25**: 52–53<br>A. What is the relation of a high sprouting test to high vegetative power?<br>**276**: 149–154, esp. 151<br>B. What conditions are required for sprouting seeds?<br>**285**: 70–75<br>C. Is lettuce seed naturally strong or weak?<br>a. How shall you make a test for percentage of germination?<br>**1**: 230–231 **5**: 49, 51 **31**: 25–27 **271**: 280 **75**: 20 **876**: 87–88<br>b. Make the test for strength, using lettuce seed instead of corn, and otherwise following directions given in reference.<br>**285**: 81–82<br>D. How shall you test your lettuce seed for percentage of impurities?<br>**5**: 51–52 **876**: 88<br>E. What is "longevity" of seeds, and how does lettuce seed compare with other seeds in longevity?<br>**5**: 405 **276**: 138<br>F. Do new and old seeds look alike? How do they differ?<br>**25**: 46 **279**: 388<br>G. Is large seed better than small? Why?<br>**5**: 53–54 **279**: 388 **876**: 226–227<br>H. How may large be separated from small?<br>**25**: 46<br>I. What is the cheapest seed? [2]<br>**5**: 52–53 |

[1] What is a seed? **279**: 381. Why is lettuce called an "annual"? **31**: 33 **38**: 361. Most of seed is produced where? **39**: 355. Is changing seed ever an advantage? **279**: 384–386.

[2] What are other seed tests which may be made? **767**: 202–211.

## Lettuce growing — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 4. **Seed, get when and where?** — *Continued.* | (4) Where can you get the highest grade lettuce seed?<br>(5) When can it be had?<br>(6) At what cost? |
| 5. **Fertilize with what, when, and how?** | (1) Has your garden been heavily fertilized with stable manure?<br>A. What is heavy manuring for a garden?<br>**31**: 17–19<br>B. How many cords of manure per acre may be used for lettuce?<br>**25**: 145–146 **31**: 113<br>C. Has your manuring been sufficient for your lettuce?<br>(2) Shall you use a mixture of commercial fertilizers for your garden?<br>A. What is a " basic mixture " for vegetable growing?<br>**276**: 104–106 **633**: 267<br>B. How apply?<br>**39**: 59–65 **285**: 15<br>(3) What special kind of commercial fertilizer gives the quickest and best growth of lettuce? What are the sources of it and symbol for it?[1]<br>**5**: 116–123 **25**: 146 **26**: 225 **39**: 356<br>**276**: 359 **633**: 277<br>A. What is the relation of the quality of lettuce to rapid and continuous growth?<br>**276**: 106 **292**: 178<br>B. How, when, and at what rate may nitrate of soda be safely applied?<br>**25**: 146–147 **26**: 27–28 **31**: 7 **39**: 60–61<br>**292**: 178 **409**: 57<br>C. How do plants feed?[2]<br>**1**: 96, 105, 107 **5**: 64–67 **285**: 17–20<br>**750**: 16–17 **768**: 62–66<br>D. Why is a fertilizer which is readily soluble "quick acting"? |

[1] What tests or experiments have you made for noting the presence of nitrogen and its action? What can you say of its sources and its relations to plants? **1**: 79–80, 98, 100 **5**: 60, 61, 63, 97, 113, 116, 119, 121, 122, 136, 138, 139, 140, 141 **292**: 226–248 **409**: 10, 11, 20, 37, 43, 49, 87, 92, 97, 99, 105, 108, 110, 170, 171, 205, 214, 216, 217 **410**: 26–30, 179–184, 339 **747**: 24, 34, 35, 37, 38–40 **761**: 28 **768**: 21–23.

[2] What do you know about the nature and growth of roots? **292**: 39, 41, 45, 49, 50, 60, 61, 62, 77, 82, 160, 161, 167, 247, 447 **768**: 62–66

## Lettuce growing — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| **5. Fertilize with what, when, and how?** — *Continued.* | (4) If your lettuce area is small, may liquid manure be used to advantage?<br>A. How prepare it? How control its "strength"? Is it a plant food or a "plant tonic"?<br>**24**: xix **25**: 101–102, 104 **39**: 61 **876**: 104<br>(5) When shall you get your plant food supplies?<br>(6) What will be the cost of your lettuce fertilizer?<br>Compare **25**: 33 |
| **6. Shall you use lime?** | (1) Is your land "quick"?<br>A. When is land "quick"?<br>**276**: 85<br>B. How may lime aid quickness?<br>**276**: 96 **285**: 149, 200 **876**: 230<br>(2) Should lime be used in vegetable growing? How find out?<br>**5**: 126 **25**: 7 **39**: 65–66 **279**: 310<br>**752**: 98 **767**: 95–99 **770**: 46–50<br>(3) Is lettuce sensitive to soil acidity?<br>**5**: 126<br>(4) When and in what forms may lime be applied?<br>**5**: 127–128 **278**; 70 **279**; 302–311, 314<br>(5) What will your lime cost? |
| **7. Prepare ground for seed with what and how thoroughly?** | (1) What is the relation of a thoroughly pulverized seed bed to germination and growth? Best tools to use? Cost? Best method of using them?[1]<br>**1**: 74–76, 83–87, 96, 190 **11**: 87–114<br>**13**: 9–10, 15, 21–22 **24**: xix **25**: 35–42<br>**39**: 28–40 **276**: 155 **278**: 91–122<br>**279**: 390–392 **285**: 90–92, 156–158 **767**: 67–72<br>**770**: 5–6 **876**: 77–78, 88–89<br>(2) Keep accurate record of cost of preparing ground, including proper proportion of original plowing and harrowing. |
| **8. Plant how?** | (1) Shall you plant by hand or with a seed-sower?<br>**11**: 117 **16**: 97 **24**: xix–xx **39**: 137<br>**276**: 163–164 |

[1] What do you know about the history and kinds of tillage tools? **5**: 82–94 **25**: 31–32 **271**: 81.

## Lettuce growing — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| **8. Plant how?** — *Continued.* | (1) Shall you plant by hand or with a seed-sower? — *Continued.*<br>A. How is a seed-sower set for lettuce seed?<br>B. How is lettuce seed planted by hand?<br>**25** : 54–55 **39** : 135<br>(2) Shall you soak your seed? Why?<br>**39** : 134<br>(3) Shall your rows be straight? Why?<br>**25** : 36<br>(4) Plant how deep, and how far apart between rows and between plants? To what extent should size of seed, time of year, weather and soil conditions control depth and distances?<br>**1** : 190 **11** : 117–118 **13** : 47<br>**25** : 53–54, 327, 331 **31** : 113 **39** : 133–134, 357<br>**285** : 81 **747** : 254 **753** : 159 **874** : 89–93<br>(5) Keep itemized record of cost of planting. |
| **9. Cultivate how?** | (1) Shall you cultivate your lettuce with both horse and hand tools? State your plan and reasons.<br>**11** : 95–96, 101–107 **16** : 96–103 **25** : 35–37<br>**27** : 18, 52–56, 157–159 **39** : 358 **276** : 360<br>**853** : 112–113 **876** : 76–81<br>(2) Keep items of cost of cultivation. |
| **10. Shall you water?** [1] | (1) What is "free" water? How far from the surface is the "free-water" level in your lettuce ground?<br>**285** : 48–49 **289** : 45–46 **683** : 29<br>(2) What is "capillary" water? Perform at least one experiment for observing the movement of "capillary water."<br>**25** : 55–56<br>**285** : 44, Fig. 24; 48, Fig. 26, Fig. 27; 49–50, Fig. 28<br>**289** : 41 **681** : 40 **747** : 14 **762** : 80–85<br>(3) What is "film" water? How much film surface has a cubic foot of clay loam particles?<br>**5** : 80 **285** : 50–52 **289** : 22–24 **581** : 4–5<br>**683** : 30 **747** : 10–12 **762** : 75–80<br>(4) Where does all water come from?<br>**5** : 61 |

[1] What part has water played in soil formation? **289**: 7–15 **681**: 10–14 **688**: 3, 11, 15 **685**: 74–108.

## Lettuce growing — Continued

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| **10. Shall you water?** — *Continued.* | (5) What use does a plant make of water, and how does it take it from the soil? Perform an experiment for observing the process of "osmosis."[1]<br>**5** : 64–67, 73 **285** : 39 **289** : 42–43 **298** : 64<br>**752** : 17–21 **768** : 16–19, 24 **772** : 201–204<br>(6) What is the comparative water-absorbing power of different soils, including a good quality of garden soil?<br>**285** : 45, Fig. 25<br>(7) What quantities of water do different plants require for maturing their crops?<br>**5** : 62–63, 67 **285** : 40<br>(8) Does lettuce require much or little water for the quickest and best growth?<br>**34** : 83 **39** : 358<br>(9) What is meant by "watering with the hoe"?<br>**5** : 85–86 **25** : 55–56 **876** : 102–103<br>(10) Under what conditions, if at all, is it advisable to water after sowing lettuce seed?<br>**25** : 56<br>(11) Why "never sprinkle"? When, how, and in what quantities should water be applied?<br>**1** : 190–191 **11** : 100 **13** : 22–23<br>**25** : 41, 104–107 **31** : 114 **876** : 104<br>(12) Keep account of cost in time and equipment for watering. |
| **11. Protect from what plant enemies, and how?** | (1) What enemies attack the lettuce plant?<br>A. Indoors or under glass?<br>B. In the open?<br>**24** : 123 **25** : 71–72, 149 **26** : 226 **30** : 3–16<br>**39** : 356, 358 **274** : 273, 322 **276** : 361<br>**292** : 179–180 **768** : 102 **876** : 119<br>(2) Which need you fear?<br>(3) What protection against flea-beetle?<br>**25** : 71–72<br>(4) Mice?<br>**39** : 356<br>(5) Cutworms?<br>**25** : 73, 76 **276** : 38 **558** : 47<br>(6) Keep account of expense for protection in time and materials. |

[1] What are "plasmolysis" and "wilting" of lettuce? **278**: 69, 80, 81.

## Lettuce growing — Concluded

| 1<br>Guiding Questions for Planning this Project | 2<br>Guiding Questions for Studying and Understanding this Project |
|---|---|
| 12. How harvest, dispose of product, and balance the lettuce account?[1] | (1) For family use? Credit received at market price?<br>**11** : 483 **13** : 35 **24** : 153 **26** : 224–225 **39** : 357<br>(2) For sale? Blanched?<br>**11** : 484 **39** : 352, 358<br>(3) What principles of salesmanship and accounting shall you put into practice?<br>**5** : 380–383 **39** : 162, 163<br>**276** : 214–224 **465** : 109–138, 139, 144, 145–197<br>**492** : 1–21, 22–41, 82–100, 143–152<br>**753** : 327–328 **761** : 154–160 **782** : 157, 159<br>**850** : 33, 35, 41, 42, 69, 72, 74, 77, 79, 87, 88, 92<br>(4) Shall you keep a separate lettuce account, or include outlay and receipts in the account of the kitchen-gardening project as a whole? |

[1] How serve lettuce? Its place in an attractive and wholesome diet? **25**: 147–149, 182 **874**: 119–120.

# CHAPTER V

## EXAMPLE OF A STATE AGRICULTURAL PROJECT STUDY BIBLIOGRAPHY

THIS chapter sets forth the Massachusetts method of listing agricultural project and related study reference materials and their sources. The entry numbers in the first column fit this bibliography into the plan of outline making presented in the foregoing chapter.

FIG. 95. — Lessons in lawn making. Boys re-worked and carefully graded front yard at school. Made ornamental planting plan for borders and set out shrubbery. A real job. An improvement project suited to "group instruction." Also a gift of beauty to the public. Ashfield Agricultural Department.

This chapter, accordingly, includes the original bibliography, printed in 1912, with a few revisions; also, entries in italics from the later typewritten supplements.

It will be noticed that the entries include no bulletins and no circulars. It was soon found that original bulletins were reap-

pearing in more or less revised forms under new numbers, with altered paging, and sometimes with titles changed. Announcements of such literature are now regularly issued by the States Relations Service of the United States Department of Agriculture, and may be had gratis by any agricultural instructor on his request. The Specialist in Agricultural Education of that Service also has a good plan for arranging such literature for ready reference which he will send to any instructor who asks for it.

The classification of reference materials made in this bibliography was intended to help the agricultural instructor keep his teaching and

FIG. 96. — Anticipate future needs when planning. Bird's-eye view of possible growth of Smith School, Northampton. First building at center. Second, since built by trade department, rear of central building. Sixteen-acre plateau reserved for campus.

teaching materials in proper order and perspective. The reader may review this classification by glancing at the table of contents, Chapter V, Section 4. In another state where uniform numbering, even for the first five-year or ten-year period, did not appear to be desirable, an " expansive " decimal system, such as that which can be found in agricultural college libraries, might be preferred. In the absence of books especially adapted to the project plan of teaching, this classification and this assignment of entry

numbers for state-wide use have been highly valuable aids to rapid and steady progress.

This bibliography and its supplements are not available for general distribution. The lists have been so widely requested and so strongly commended that printing them here is believed to be warranted. Let it only be remembered that needs of Massachusetts were the determining factors in both the choice of materials and the plan of their presentation.

### 1. Approved Agricultural Papers and Periodicals

Each vocational agricultural library should regularly receive such current literature as that here listed. The pupils should, moreover, be encouraged to subscribe for those publications which promise to

FIG. 97. — Landscape planting plan for 16-acre tract set apart for buildings, lawns, athletic field, walks, and drives has been adopted. Pupils working it out year by year. Assists ornamental planting and care at home. Smith School, Northampton.

be most useful in their individual home work. Club rates may generally be secured where several persons subscribe together.

In order to place their literature regularly before the entire school or department, these publishers may be willing to send the literature gratis to the school or department libraries. This privilege should

be requested. For Massachusetts purposes, the literature here named is important and has been considered sufficient; but additions or substitutions may be proposed to the Board of Education for approval.

| Name of Publication | Frequency of Issue | Publisher's Address | Price per Year |
|---|---|---|---|
| (1) New England Homestead . . . . Practical questions answered by New England Agricultural Experiment Station officers. Good market reports. | Weekly . . . | Springfield, Mass. | $1 00 |
| (2) Rural New Yorker . . . . . Attention given to live-stock, vegetables, and fruit. By some Massachusetts men esteemed a general farm paper second to none. | Weekly . . . | New York . . . | 1 00 |
| (3) Breeder's Gazette . . . . . Held to be "the ranking stock paper of the country." | Weekly . . . | Chicago . . . . | 2 00 |
| (4) Hoard's Dairyman . . . . . "Accepted as the best all-round dairy paper published in this country." | Weekly . . . | Fort Atkinson, Wis. | 1 00 |
| (5) Market Growers' Journal . . . . A Massachusetts market gardener says of this paper: "A strictly trade paper. . . . Not large, but strictly all 'meat' for vegetable growers." | Weekly . . . | Louisville, Ky. . . | 1 00 |
| (6) The Garden Magazine . . . . . Excellent articles on home gardening, including ornamental planting. | Monthly . . | Garden City, N. Y. | 1 50 |
| (7) Gleanings in Bee Culture . . . . Valued very generally by bee-keepers. | Twice a month | Medina, O., A. I. Root Company . | 1 00 |
| (8) Wareham Courier . . . . . Official organ of the Cape Cod Cranberry Growers' Association. | Weekly . . . | Wareham, Mass. . | 1 50 |
| (9) The Better Fruit . . . . . Held by the best authority on fruit in Massachusetts to be "a fine thing for our eastern growers to take." | Monthly . . | Hood River, Ore. . | 1 00 |
| (10) Park and Cemetery, and Landscape Gardening . . . . . "The best periodical dealing with ornamental planting." | Monthly . . | Chicago . . . . | 2 00 |

FIG. 98. — Between the Acts — Cutting a melon. Hadley Agricultural Department.

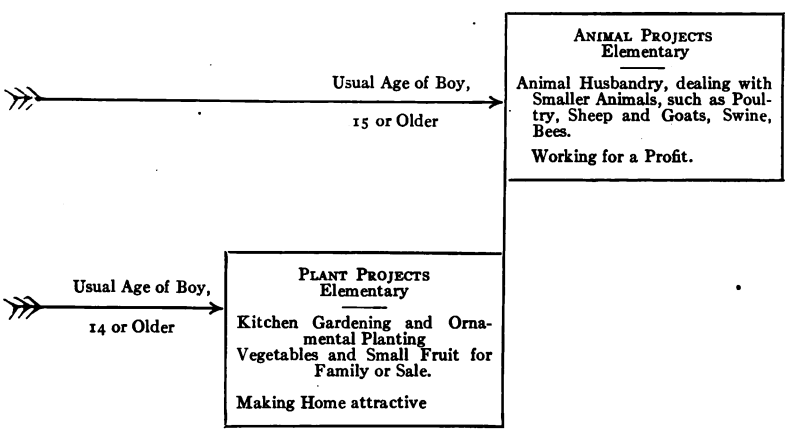



FIG. 99. — Second year projects for schools in all years; and for first and second year boys in high school departments in odd years, focus upon production of smaller farm animals. Boy may continue plant projects, and in them learn independence, — to help himself. Help from the instructor will center upon the animal projects. Investment and responsibility greater than in first year; but boy is head taller, and bigger in every way. In first or second year, as side-lines of effort, with incidental advice and help from his instructor, he may begin keeping records of cows, feeding balanced rations, pruning and spraying. His main school business, however, for each year, is the productive work assigned to that year. See pages 62–63.

### 2. Free Bulletins, Circulars, and Reports

(1) **The Federal Board for Vocational Education.** — The "Smith Hughes Act" appropriates funds "for the purpose of making studies, investigations, and reports to aid in the organization and conduct of vocational education." Each school and department should keep a complete file of the literature published pursuant to this Act. Requests for this literature should be addressed to the Federal Board for Vocational Education, Washington, D. C.

(2) **The United States Bureau of Education** has closely followed the development of vocational agricultural education of secondary

FIG. 100. — Second-year projects which deal with smaller farm animals may include sheep. Franklin Johnson's home project. 34 sheep. Sheep raising is receiving increasing attention in parts of Massachusetts. Petersham Agricultural Department.

grade. The report of the commissioner for 1911 contains "a complete summary of the status of secondary agriculture in each State," and "a description of some types of secondary agricultural schools." The agricultural instructors should apply on behalf of their school or department libraries for such of the free publications of the Bureau as bear upon vocational agricultural training in secondary schools.

Applications should be addressed to the United States Commissioner of Education, Washington, D. C.

(3) **The United States Department of Agriculture** issues three regular series of bulletins and other documents related to the work of

divisions. **A.** The *Farmers' Bulletins* are issued in large editions and may be secured free by either teachers or pupils.

**B.** Professional papers known as *Department Bulletins* deal with special subjects which interest a limited group. The free edition is limited, but copies may usually be had at small cost by addressing the Superintendent of Documents, Government Printing Office, Washington, D. C.

**C.** The *Journal of Agricultural Research* is technical in nature and would be of little value to pupils in high schools. Occasional numbers will be of value to individual instructors.

The Division of Publications issues each month a list of the publications of the preceding month. It also issues the Farmers' Bulletin

FIG. 101. — Harold Legare, 17. His first litter from his first pair of pure-breds. Mother bit thin, because doing double duty of nursing her young and subduing rough land for cultivation. Now has ninety head. Refused job as herdsman on farm breeding Berkshires, in order to develop his home projects. Petersham Agricultural Department.

list which is revised frequently. Any person may have his name placed on the mailing list to receive these announcements by applying to the Editor-in-Chief, Division of Publications, United States Department of Agriculture, Washington, D. C.

The division of Agricultural Instruction of the States Relations Service issues multigraphed lists of Department publications, classified for the use of teachers, and these are frequently revised. The same division has documents for secondary schools, lantern slide service lists, and other helps which will be mailed as issued to institutions requesting them. Lists of references for specific problems related to agricultural education are prepared and sent in typewritten form in

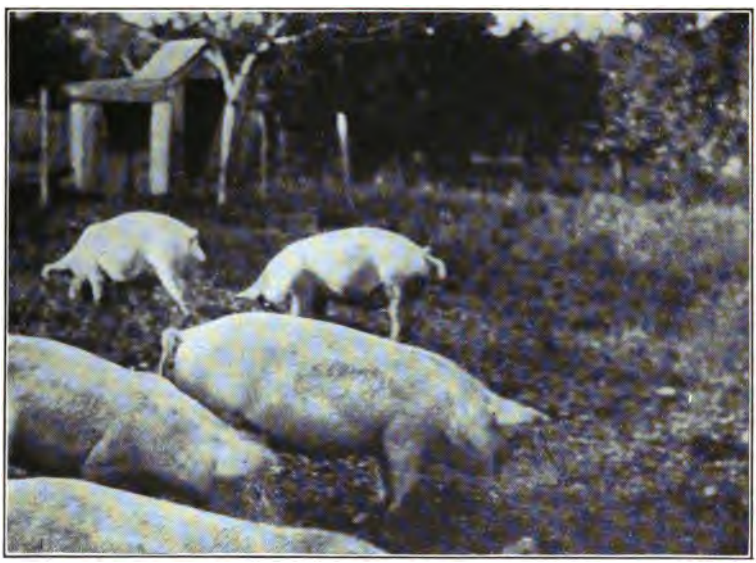


FIG. 102. — John Chadwick's pig and orchard project at home. Pigs cleaning up windfalls and destroying wormy fruit. Inexpensive cultivation. Growthy condition. Finished off in small pen on home-grown feeds. Essex County Agricultural School.

response to special requests. Other divisions of this Service issue club literature and other publications which are not listed monthly since they are for limited distribution.

The Yearbook of the Department is of much value and may best be obtained from the Members of Congress. Weather maps, crop reports, and other special publications should be obtained from the several bureaus. Of unusual value is a recent " Contribution from Office of Farm Management " entitled " Geography of the World's

Agriculture." This is profusely illustrated and should be in every agricultural school and department library.

(4) **The Agricultural Experiment Stations** also issue literature of value to progressive farmers, and therefore of value in the project method of training. In Connecticut and in New York there are two such stations; in every state there is at least one.

While many institutions desire to avoid heavy demands from outside their states, sharp lookout should be kept for such literature. Such a lookout may be kept by means of the "Card Index of Experiment Station Literature," which is published by the United States Department of Agriculture. Thirty-seven thousand six hundred cards have already been printed.[1] Each agricultural school and department library should include partial sets of these index cards.

[1] In order to show the exact nature of the clews to station literature, pertinent in one respect or another to Massachusetts farming projects, which this card index affords, the subject matter on four cards is here printed. These cards are of uniform size, 2"×5"

Index Card 31806.

"**Poultry Appliances, Labor-saving,**" — J. E. Rice and C. A. Rogers.
"*New York Cornell Bul. No. 284, Nov., 1910, pp. 51* .....

"Directions are given for the construction of inexpensive, unpatented labor-saving devices for poultry raising. They include feeding and watering devices, pedigree and egg-collecting appliances, catching and carrying devices, shipping packages, coops for sitting hens, fattening coops, a rack for sprouted oats, a burglar-alarm system, and an improved killing and picking box."

Index Card 31810.

"**Milk Pails, Covered, Tests.**" — H. A. Harding, J. K. Wilson and G. A. Smith.
"*New York State Bul. No. 326, Dec., 1910, pp. 249–381, pls. 4* .....

"A report of experiments to determine the effect on the germ content of using improved milk pails. More than one-half the infection that milk receives during the milking process can be prevented by use of a covered pail. Such a pail, less than 12 inches high and provided with an elliptical opening 7 by 5 inches, is practically as convenient for milk as the open pail. Such a cover can be placed on an open pail by any tinsmith at very little expense. This pail is inexpensive, durable, easily cleaned, and one of the most efficient in keeping bacteria out of milk."

No complete sets of these index cards are available, but incomplete sets that are short about ten thousand cards pertaining to the earlier station literature may be purchased through the Office of Experiment Stations at $2.00 per thousand cards, with an additional charge of $1.25 for a set of colored division cards. Cards dealing with certain divisions of this index, as "Poultry," "Fertilizers," and the like, may be purchased at the cost of $3.00 per thousand cards.

Complete information in reference to the method of purchasing this card index, together with the number of cards available, and a key containing the system of classification will be sent on application to the Office of Experiment Stations, States Relations Service, United States Department of Agriculture, Washington, D. C.

Index Card 31831.

"**Vegetable Garden.**" — W. H. Wicks.

"*Idaho Bul. No. 69, Aug., 1910, pp. 49, figs. 10, dgms. 2* .....

"The record for two years is given of a ½ acre vegetable garden established in the spring of 1908 on the horticultural grounds of the Idaho station. The value of the products in 1908 was $82.19, with net profits of $57.41; in 1909, $98.38, with net profits of $79.22. The conclusion is reached that by judicious arrangement of the garden a continuous supply of vegetables may be secured throughout the season. A plan is given of a farmer's vegetable garden, together with cultural suggestions on farm garden crops and recommended varieties."

Index Card 31943.

"**Feeding Experiments with Pigs.**" — A. L. Stabler.

"*Maryland Bul. No. 150, Jan., 1911, pp. 93–120, fig. 1* .....

"Pigs fed silage made faster gains than those fed ground fodder mixed with their feed. Young pigs made faster gains on corn meal and skim milk than on shelled corn and skim milk. Pigs fed mixed grain soaked twenty-four hours made faster and more economical gains than those fed the same mixture dry or fresh soaked. Chopped alfalfa failed to take the place of a part of the middlings in a ration consisting of shelled corn, wheat middlings, and skim milk. Soft coal in unlimited quantities seemed unharmful for pigs in pens. The use of a tonic mixture, wood charcoal, and soft coal as correctives increased gains. Other feeding tests are reported."

**Massachusetts Agricultural Experiment Station** literature, of course, is covered by the card index above described. Following is a list of the bulletins and circulars now available:

*Bulletins and their numbers:*

133. Green Crops for Summer Soiling.
144. Relation of Light to Greenhouse Culture.
150. Report of Experimental Work in Connection with Cranberries, 1913.
153. Summary of Meteorological Records for Twenty-five Years (1889–1913).
154. Alfalfa.
158. The Composition, Digestibility and Feeding Value of Molassine Meal, Cottonseed Meal and Hulls, Cocoa Shells, Grain Screenings, Flax Shives, Mellen's Food Refuse and Postum Cereal Residue (CXX Feed).

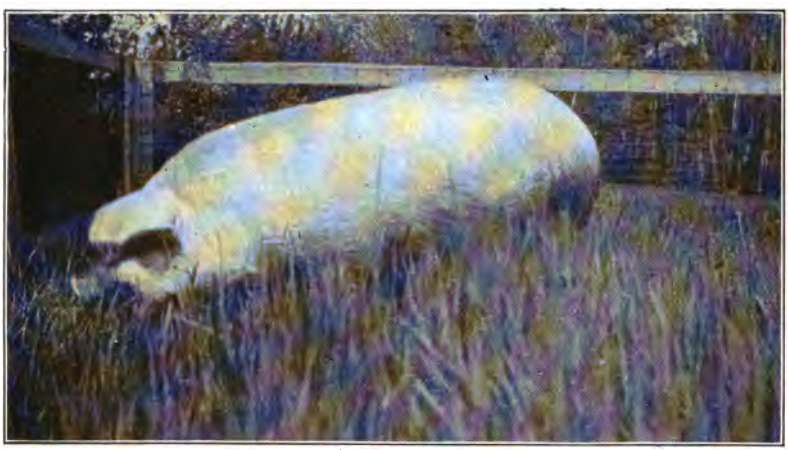


FIG. 103. — Chester White brood sow on good pasture. Essex County School.

160. Report of Cranberry Substation for 1914.
162. Phosphates in Mass. Agriculture; Importance, Selection and Use.
166. Improved Methods for Fat Analysis.
167. I. The Relation of Hydrogen Ion Concentration of Media to the Proteolytic Activity of Bacillus Subtilis. II. Proteolysis of Strept. Erysipelatis and Strept. Lacticus Compared under Different Hydrogen Ion Concentration.
168. Report of Cranberry Substation for 1915.
170. Shade Trees, Characteristics, Adaptation, Diseases and Care.
171. A Chemical Study of the Asparagus Plant.

172. Experiments in Keeping Asparagus after Cutting.
174. The Composition, Digestibility and Feeding Value of Pumpkins.
175. Mosaic Disease of Tobacco.
176. The Cause of the Injurious Effect of Sulfate of Ammonia when Used as a Fertilizer.
177. Potato Plant Lice and Their Control.
178. The European Corn Borer (*Pyrausta nubilalis* Hübner), a Recently Established Pest in Massachusetts.

FIG. 104. — A vigorous Chester White litter. Essex County Agricultural School.

179. The Greenhouse Red Spider Attacking Cucumbers, and Methods for Its Control.
180. Report of the Cranberry Substation for 1916; and Observations on the Spoilage of Cranberries Due to Lack of Proper Ventilation.
181. Digestion Experiments with Sheep.

*Control Bulletins:*

7. Inspection of Commercial Feedstuffs, 1917.
8. Inspection of Commercial Fertilizers, 1917.

*Circulars and their numbers:*

44. Suggestions for Judging Agricultural Adaptation and Value of Land.
45. Chemical Analysis of Soils.
59. The Use of Fertilizers in 1916.
60. Suggestions for the Use of Fertilizers for Tobacco and Onions for 1916.
63. Balanced Rations for Dairy Stock.

Applications for these and future publications of like character should be addressed to the Director of the Massachusetts Agricultural Experiment Station, Amherst, Mass.

FIG. 105. — Examination of brain of pig that died of unusual disease. Professional veterinarian operating. Instructor Blodgett said, "Of course the farm biology teacher was on hand, and several very practical lessons in anatomy and physiology were taught in such a way as not soon to be forgotten." Essex County Agricultural School.

(5) **The Extension Service of the Massachusetts Agricultural College** publishes at irregular intervals bulletins and circulars on agricultural subjects written by specialists of the college faculty. These are issued for residents of Massachusetts and for conditions found within the state. Following is a recent list:

*Extension circulars:*

5. The Control of Onion Diseases and Thrips.
7. Control of Diseases and Injurious Insects of Stone Fruits.
8. Control of Diseases and Injurious Insects of Potatoes.
9. Molasses for Farm Stock.
10. The Feeding Value of Apple Pomace.
11. Civic Improvement in Village and Country.
12. A Guide to Reading in English Fiction.
13. Soils and Fertilizers for Cabbage, Cauliflower and Other Crucifers.
14. Classified List of Available Farmers' Bulletins.
15. How to Grow More Corn per Acre.
16. Plans for Family Garden.
17. Hogs on Every Farm in 1917.

18. Have You a Backyard Poultry Flock?
19. The Farm Poultry Flock in 1917.
20. Mass. Farmers — Raise More Corn in 1917.
21. Plant Beans in 1917.
22. Planting Table for the Home Vegetable Garden.
23. Farmer's Home Garden.
24. Boys' and Girls' Club Garden.
25. Cropping and Fertilizer Suggestions for 1917.
26. Present Poultry Situation.

FIG. 106. — Half a hundredweight of honey a season may be expected from a single hive of bees. Boys and girls readily learn to handle bees and care for them. In well-planned farming they are important side-lines to vegetable and fruit-growing projects. A group exercise. Smith School, Northampton.

27. Potato Growing.
28. Importance of Dairy Cow.
30. Seeding Mowings.
31. Cutworms.
32. Fruit Products.
33. The Dairy Problem.
34. Spraying Apparatus — Materials.
35. Bean Diseases and Insects.
36. Substitutes for Milk in Raising Calves.
37. Methods of Saving Fats.

38. Canning of Fruits and Vegetables.
39. Preparation Wastes.
40. Table Wastes.
41. Storage Wastes.
42. Labor Saving Machinery.
43. Swine Feeding.

FIG. 107. — Robert Sweet's home project. "Safety First," — giving them a little smoke before opening the hive. School projects help home projects, or fail of their fundamental purpose in Massachusetts. North Easton Agricultural Department.

44. Do You Need a Silo?
45. The Home Vegetable Storage.
46. Fruit Products.
47. How to Save Wheat Flour.
48. Clover and Lime.
49. Storage for Vegetables, An Outdoor Pit.

50. Potato and Cornstalk Borer.
51. Winter Rations for Laying Hens (low stock).
52. Marketing Cabbage through Sauerkraut.
53. Poultry Manures, Their Use and Treatment.
54. Control of Weeds by Chemical Treatment.
56. The Soy Bean.
58. Hotbeds and Cold Frames.
59. Poultry Farm Disinfection.

*Boys and girls series:*

7. A Redirected Rural School.
6. Canning and Marketing.
11. Primer of Instruction, Home Ec. Club.

*Extension bulletins*

7. The Town Common.
9. Farm Management Demonstration Work in Massachusetts.

FIG. 108. — Part of poultry plant in winter. Trees in chicken yards. Hot-water brooder house, incubator cellar, room for caponizing, killing, dressing, and packing for market. Colony houses elsewhere. Bristol County Agricultural School.

10. Advertising the Apple.
11. Cost of Milk Production.
14. Cost of Milk Distribution.
15. Milk: A Cheap Food.
18. Sterilization of Tobacco Beds.
19. Cost of Milk Production in Massachusetts.

*Bulletins for farm women:*

1. Announcement and List of Available Lit. in Home Ec.
3. The Septic Tank.

4. Our Daily Food (Low stock).
Educational and Demonstrational Hog Cholera Work, Hog Cholera and Its Preventive Treatment.

The above publications and others as issued may be had by addressing The Director of the Extension Service, Amherst, Mass.

(6) **The Massachusetts Board of Agriculture** publishes agricultural bulletins and reports. In addition to the annual volumes, the Board of Agriculture has printed such special bulletins as the following:

1. Poultry Culture.
2. Apple Growing.
3. Grasses and Forage Crops.
4. Vegetable Growing.

It has also published circulars on various agricultural subjects, and nature leaflets.

Applications for its publications, or for lists of those available, should be addressed to the Commissioner of Agriculture, State House, Boston, Mass. Copies may be had not only by the libraries, but also by individual agricultural pupils in Massachusetts.

(7) **The State Forester's** work closely concerns all farmers who are confronting the problems of protection against brown-tail and gypsy moth depredations, of protection against forest fires, and of economically cropping their wood or timber lots, and of disposing of lumber to their best advantage. Each agricultural school and de-

FIG. 109. — Harold Ashley and his hatch on the school farm. He is now Club Leader in Farm Bureau Department of this school. Bristol County Agricultural School.

partment should keep a complete file of the State Forester's publications. Most of these publications are fully illustrated and may be had by both the libraries and the individual agricultural pupils.

Following are the publications now available in Massachusetts:

The Older Forest Plantations in Massachusetts.
Forestry in Massachusetts.
The White Pine in Massachusetts (Log scales; volume tables).
Reforestation in Massachusetts.
The Chestnut Bark Disease and Chestnut Utilization.

FIG. 110. — Poultry projects are practically universal among pupils in both schools and departments. William Pierce, Jr., 16. Part of home project. Has two colony houses. Also potato and beet projects. Concord Agricultural Department.

Improvement Thinnings (Gypsy Moth Thinning).
How to Collect Pine Seed.
Forest Taxation Law.
Forest Fire Laws.
Forests of Worcester County.
Forest Fire Notices.
Forest Trees of Massachusetts.
Study of Trees in our Primary Schools.
Forests of Plymouth County (In preparation).
The Gypsy Moth.

Parasites of the Gypsy and Brown-tail Moth.
The Brown-tail Moth.
The Brown-tail Fungus.
Annual Report of the State Forester.

Applications for these and future publications should be addressed to the State Forester, State House, Boston, Mass.

### 3. Text, Exercise, and Reference Books.

Copies of the books hereafter listed in this bibliography are on file in the agricultural library of the Board of Education, where they may be examined by school officers. Where vocational agricultural school and department work is started, certain copies should be

FIG. 111. — William Pierce, Jr., again. Houses for mothers and chicks in young orchard. Wire fronts closed at night to keep cats and other enemies out. Fruit trees pruned and sprayed. Concord Agricultural Department.

provided at the outset. These are necessary parts of an approved equipment. Others may be added in succeeding years, until an adequate working library has been established.

(1) **Instructor's aid necessary.** — It is, of course, understood that the following lists are for the convenience of the several instructors,

and for use by classes, with the help, step by step, of their instructors. Reference materials, therefore, suited to minds of different grades of maturity have been included. Some have been successfully used in elementary schools; others, by secondary schools, and even by college classes. The instructor's intimate knowledge of the needs and mental capabilities of his individual boys will determine his assignment of both laboratory exercises and reading matter.

(2) **Lists subject to revision.** — It is to be expected that from time to time additions to these lists will need to be made. Suggestions as

FIG. 112. — Part of Clarence Goodnow's pen of layers in poultry club contest. Such contests are aids to efficient agricultural teaching. Petersham Agricultural Department.

to usable additions are earnestly solicited. The instructors are especially requested to report which of the entries here included prove best suited to their different classes. The most competent revision of these lists will thus be assured.

(3) **Prices and estimates.** — Postage or express charges must be added where prices are marked "net." For example, "The Country-life Movement," by Prof. L. H. Bailey, listed at $1.25 net, costs by mail, $1.34. Discounts from prices not marked "net" may usually be expected. Book dealers carry a considerable stock of

many of the books named in these lists, and are very glad to quote prices on books to be delivered at any given point with postage or express prepaid. It is advisable to secure estimates from the publishers or from reliable dealers before ordering.[1]

(4) **Student purchases.** — Prof. L. H. Bailey, in addressing winter short-course students at the Cornell Agricultural College, is reported to have said that he hoped, if they took nothing else home, they would take home with them ten or twelve dollars' worth of good books dealing with the branches of practical agricultural production which they expected to follow. A similar hope might well be expressed on behalf of the boys who seek vocational agricultural training in schools and departments.

Fortunately a few most excellent books for home guidance in profitable farm work are now to be had at moderate cost. The agricultural instructors may properly enough seek to stimulate the boys in their classes to purchase one or more such books every year. Wise guidance may be given by observing which books actually prove to be most useful to the individual boys in carrying out their particular home farm projects.

Publishers will undoubtedly be very willing to allow the boys their most favorable school discounts, especially if orders are forwarded through the school purchasing agent.

(5) **Reference numbers — First column.** — The Arabic numbers at the left of the entries are for convenience in referring to materials found in this bibliography.[2]

**A. Library arrangement.** — If these numbers are put on the backs of the books, it is not necessary to consult these printed lists in using the agricultural library. The pupil or instructor may go directly to the books themselves, on the library shelves. In cases where schools already have libraries and systems of numbering, these special numbers may be added by the price tag device shown in Fig. 51 on p. 65 during the time the books are at the disposal of the agricultural department.

[1] Prof. G. F. Warren, "Elements of Agriculture," pp. 402, 403 (see below, No. 5), lists a foundation set of secondary school agricultural reference books purchasable for about $50.

[2] A similar use of numbers for ready reference has been made in "Laboratory Exercises in Farm Management," by Warren and Livermore.

**B. Project outlines.** — In the suggestive outlines for project instruction in the foregoing chapter the following entries are referred

FIG. 113. — Home project. Open front house on hillside, near running brook and among large deciduous trees. Shady in summer and sunny in winter. No two home projects alike. Ashfield Agricultural Department.

to by number, not by title. Instructors in their own outline making have found it convenient to use these numbers.

**C. Library card indexes.** — At the pleasure of the school officers, card indexes by authors and by titles may be made. The author

index may then be arranged alphabetically by names; and the title index may be alphabetically arranged by subjects, such as "Dairying," "Vegetable Growing," and "Fruit Growing." In such a case, the books themselves would remain in the numerical order here adopted, and each card would bear the number assigned the particular title in these lists. Any book, for example, could thus be found instantly; and, after use, could be returned to its proper place by simply looking at its number.

FIG. 114. — Neither land nor live-stock at this high school. But note bulletin board kept in "project study" room. Home land and live-stock are worked with. Vincent Hatch has a poultry project. North Easton Agricultural Department.

**D. Future entries.** — Gaps in the numbering have been left for the possible addition of future entries.[1] Missing numbers, however, will occasion no confusion. The simple numerical order may determine the arrangement, even though now and then a gap may appear between entries.

**(6) Reference numbers — Fourth column.** — The numbers following the titles refer to the corresponding numbers at the left of the names of the publishers of the respective entries. Needless repetition of the full names and addresses of publishers is thus avoided. A complete list of the publishers and their addresses immediately follows the reference lists. (See pages 176–177.)

**(7) State help and approval.** — The State Supervisor of agricultural education will from year to year advise those who need his help in making approved selections from these lists, and in the numbering, indexing, and arrangement of agricultural library materials.

[1] Some of the gaps originally were filled by numbers assigned pamphlet materials, such as bulletins, circulars, and reports. Only books have been given entry numbers in the present chapter. All other more or less ephemeral materials are card indexed and filed for ready references, by the individual instructors.

## 4. Agricultural Project Study Bibliography, Arranged for Ready Reference [1]

### (1) — TEXTBOOKS APPROVED FOR FIRST AND SECOND YEAR AGRICULTURAL SURVEY (Choose one or more)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 1 | Mann, A. R. . . . | " Beginnings in Agriculture " . . . | 14[2] | $ 60 net |
| 2 | *Mayne and Hatch* . . | *" High School Agriculture "* . . . . | *54* | *1 00* |
| 3 | *Waters, H. J.* . . . | *" Essentials of Agriculture "* . . . . | *29* | *1 25* |
| 4 | *Grim, J. S.* . . . . | *" Elementary Agriculture "* . . . . | *107* | *1 25* |
| 4.1 | *Benson and Betts* . . | *" Agriculture "* . . . . . | *108* | *1 25* |

### (2) — TEXTBOOKS APPROVED FOR THIRD AND FOURTH YEAR AGRICULTURAL SURVEY (Choose one or more)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 5 | Warren, G. F. . . . | " Elements of Agriculture " . . . | 14 | $1 10 net |
| 6 | *Warren, G. F.* . . . | *" Farm Management "* . . . . . | *14* | *1 40 net* |
| 7 | *Harper, M. W.* . . . | *" Animal Husbandry for Schools "* . . | *14* | *1 12 net* |
| 8 | *Sampson, H. O.* . . | *" Effective Farming "* . . . . . | *14* | *1 32 net* |
| 9 | | | | |

[1] The entries above the dotted lines are arranged alphabetically by authors, by states or by government divisions, bureaus, or offices. Space below the dotted lines was reserved for additions to the original entries. The additions made are in italics.

[2] The numbers in this column are those assigned the various publishers. For the list of publishers and their addresses to which these numbers refer, see pp. 176–177.

## (3) — FOR FIRST AND SECOND YEAR STUDY OF PROJECTS IN —

### A. Vegetable Growing

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 10 | Allen, C. L. | "Cabbages, Cauliflower, etc." | 15 | $ 50 |
| 11 | Bailey, L. H. | "Manual of Gardening" | 14 | 2 00 net |
| 16 | Bennett, Ida D. | "The Vegetable Garden" | 16 | 1 50 net |
| 23 | Fraser, Sam'l | "The Potato" | 15 | 75 |
| 24 | French, Allen | "How to Grow Vegetables" | 14 | 1 75 net |
| 25 | Fullerton, E. L. | "How to Make a Vegetable Garden" | 16 | 2 00 net |
| 26 | Green, Samuel B. | "Vegetable Gardening" | 17 | 1 00 |
| 27 | Greiner, T. | "How to Make the Garden Pay" | 18 | 1 00 net |
| 29 | Hexamer, F. M. | "Asparagus" | 15 | 50 net |
| 32 | Morse, J. E. | "The New Rhubarb Culture" | 15 | 50 |
| 33 | Rexford, E. E. | "The Home Garden" | 19 | 1 25 net |
| 34 | Roberts, Harry | "The Beginner's Book of Gardening" | 20 | 1 00 net |
| 36 | Sevey, G. C. | "Bean Culture" | 15 | 50 |
| 37 | Sevey, G. C. | "Peas and Pea Culture" | 15 | 50 net |
| 38 | Vilmorin-Andrieux | "The Vegetable Garden" | 21 | 3 75 net |
| 39 | Watts, R. L. | "Vegetable Gardening" | 15 | 1 75 net |
| 40 | Wicks, W. H. | "Vegetable Garden" | 22 | |
| 41 | *Meier, W. H. D.* | *"School and Home Gardens"* | *29* | *80* |
| 42 | *Grubb and Guilford* | *"The Potato"* | *16* | |
| 43 | *Gregory, J. J. H.* | *"Cabbages and Cauliflowers"* | *103* | *30* |
| 44 | *Gregory, J. J. H.* | *"Squashes: How to Grow Them"* | *103* | *30* |
| 45 | *Greiner, T.* | *"New Onion Culture"* | *15* | *60* |
| 46 | *Tracy, W. W.* | *"Tomato Culture"* | *15* | *60* |
| 47 | *Troop, J.* | *"Melon Culture"* | *15* | *60* |
| 48 | *Terry, T. B., et al* | *"A B C of Potato Culture"* | *23* | *75* |
| 49 | *Gilbert, A. W., et al* | *"The Potato"* | *14* | *1 20 net* |

### B. Small Fruit Growing

(See also Reference No. 41)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 50 | Card, Fred W. | "Bush Fruits" | 14 | $1 50 net |
| 56 | Green, S. B. | "Popular Fruit Growing" | 17 | 1 00 |
| 59 | Maynard, S. T. | "Successful Fruit Culture" | 15 | 1 00 |
| 63 | Waugh, F. A. | "Fruit, Harvesting, Storing, and Marketing" | 15 | 1 00 |
| 64 | White, J. J. | "Cranberry Culture" | 15 | 1 00 |
| 65 | *Wilkinson, A. E.* | *"Modern Strawberry Growing"* | *16* | |
| 66 | *Biggle, J.* | *"Biggle Berry Book"* | *99* | *50* |
| 67 | *Fletcher, S. W.* | *"Strawberry Growing"* | *14* | *1 40 net* |

### C. Beekeeping

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 71 | Comstock, A. B. | "How to Keep Bees" | 16 | $1 00 |
| 73 | Root, A. I. and E. R. | "The A B C and X Y Z of Bee Culture" | 23 | 1 50 net |
| 74 | *Potter, T. C.* | *"Queenie, the Autobiography of an Italian Queen Bee"* | *112* | *75 net* |

### D. Poultry Keeping

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 80 | American Poultry Association | "The American Standard of Perfection" | 24 | $1 00 |
| 81 | Beale, Stephen | "Profitable Poultry Keeping" | 25 | |
| 83 | Boyer, M. K. | "Money in Broilers and Squabs" | 26 | 1 50 net |
| 84 | Brigham, A. A. | "Progressive Poultry Culture" | 27 | |
| 85 | Brown, Edward | "Poultry Keeping as an Industry for Farmers and Cottagers" | 28 | 6s |
| 93 | Powell, E. C. | "Making Poultry Pay" | 15 | 1 00 |
| 96 | Robinson, J. H. | "Principles and Practice of Poultry Culture" | 29 | 2 00 net |
| 97 | Sando, R. B | "American Poultry Culture" | 91 | 1 25 |
| 100 | Stoddard, H. H. | "The New Egg Farm" | 15 | 1 00 |
| 101 | Valentine, C. S | "How to Keep Hens for Profit" | 14 | 1 50 net |
| 102 | Watson, G. C. | "Farm Poultry" | 14 | 1 25 net |
| 104 | Wright, Lewis | "The Practical Poultry Keeper" | 30 | 87 |
| 105 | *Howard and McGrew* | *"Perfected Poultry"* | *94* | *2 50* |
| 106 | *Lewis, H. R.* | *"Productive Poultry Husbandry"* | *49* | *2 00* |
| 107 | *Valentine, C. S.* | *"Beginner in Poultry"* | *14* | *1 40 net* |
| 108 | *Robinson, J. H.* | *"Poultry Craft"* | *95* | |
| 109 | *Various Authors* | *"The Poultry Book"* | *16* | *1 50 net* |
| 109.1 | *Purvis, Miller* | *"Poultry Breeding"* | *33* | *1 50 net* |
| 109.2 | *Kains, M. G.* | *"Profitable Poultry Production"* | *15* | *1 50* |
| 109.3 | *Laurie, D. F.* | *"Poultry Feeds and Feeding"* | *30* | *1 00* |
| 109.4 | *Collingwood, H. W., et al.* | *"The Business Hen"* | *104* | *1 00* |
| 109.5 | *Joos, Robert* | *"Success with Hens"* | *98* | *1 00* |
| 109.6 | *Robinson, J. H.* | *"Domestic Birds"* | *29* | *1 35* |
| 109.7 | *Hogan, Walter* | *"The Coll of the Hen"* | *111* | *2 00* |
| 109.8 | *Lippincott, W. A.* | *"Poultry Production"* | *106* | *2 00 net* |

### E. Sheep Husbandry

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 113 | Wing, J. E. | "Sheep Farming in America" | 31 | $1 00 |
| 114 | Wing, J. E., *et al.* | "The Winter Lamb" | 32 | |
| 115 | *Craig, J. A.* | "*Sheep Farming*" | *14* | *1 20 net* |
| 116 | *Kleinheinz, F.* | "*Sheep Management, Breeds and Judging for Schools*" | *110* | *1 50 net* |
| 117 | *Coffey, W. C.* | "*Productive Sheep Husbandry*" | *19* | |

### F. Swine Husbandry

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 120 | Coburn, F. D. | "Swine in America" | 15 | $2 50 net |
| 121 | Craig, R. A. | "Diseases of Swine" | 15 | 75 |
| 122 | Dietrich, Wm. | "Swine" | 33 | 1 50 |
| 124 | *Day, G. E.* | "*Productive Swine Husbandry*" | *19* | *1 75* |

### G. Ornamental Planting

(See also References No. 34 and 41)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 130 | Bennett, I. D | "The Flower Garden" | 16 | $1 10 net |
| 134 | Ely, H. R. | "The Practical Flower Garden" | 14 | 2 00 |
| 135 | Fernow, B. E. | "The Care of Trees in Lawn, Street and Park" | 34 | 2 00 |
| 138 | Kirkgaard, John | "A Guide for the Gardener" | 35 | 2 50 net |
| 139 | Maynard, S. T. | "Landscape Gardening as applied to Home Decoration" | 36 | 1 50 |
| 140 | Miller, Wilhelm | "What England Can Teach Us about Gardening" | 16 | 4 00 net |
| 142 | Sedgwick, Mabel C. | "The Garden Month by Month" | 37 | 4 04 net |
| 144 | Waugh, F. A. | "Landscape Gardening" | 15 | 60 |

## (4) — FOR THIRD AND FOURTH YEAR STUDY OF PROJECTS IN

### A. Animal Husbandry

(See also references above, No. 71 f., No. 80 f., No. 113 f., and No. 120 f.)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 159 | Coburn, F. D. | "Alfalfa" | 15 | $ 50 |
| 162 | Craig, J. A. | "Judging Live Stock" | 38 | 1 50 |
| 164 | Dondlinger, P. T. | "The Book of Wheat" | 15 | 2 00 net |
| 166 | Gurler, H. B. | "The Farm Dairy" | 31 | 1 00 |
| 175 | Johnstone, J. H. S. | "The Horse Book" | 31 | 2 00 |
| 176 | Lane, C. B. | "Business of Dairying" | 15 | 1 25 net |
| 179 | Lyon & Montgomery | "Examining and Grading Grains" | 29 | 48 net |
| 182 | Michels, John | "Dairy Farming" | 40 | 1 00 |
| 184 | Myrick, Herbert | "The Book of Corn" | 15 | 1 50 |
| 187 | Plumb, C. S. | "Indian Corn Culture" | 31 | 1 00 |
| 189 | Plumb, C. S. | "Types and Breeds of Farm Animals | 29 | 1 60 net |
| 191 | Roberts, I. P. | "The Horse" | 14 | 1 25 net |
| 195 | Shaw, Thos. | "Clovers" | 15 | 1 00 net |
| 196 | Shaw, Thos. | "Forage Crops Other than Grasses" | 15 | 1 00 |
| 197 | Shaw, Thos. | "Grasses and How to Grow Them" | 17 | 1 50 |
| 198 | Shaw, Thos. | "Soiling Crops and the Silo" | 15 | 1 50 |
| 199 | Van Norman, H. E. | "First Lessons in Dairying" | 15 | 50 net |
| 201 | Voorhees, Ed. B. | "Forage Crops" | 14 | 1 50 net |
| 208 | Harper, M. W. | "Training and Breaking of Horses" | 14 | 1 75 |
| 209 | Rose, Laura | "Farm Dairying" | 91 | 1 25 |
| 210 | *Harper, M. W.* | *"Manual of Farm Animals"* | *14* | *1 60 net* |
| 211 | *Willoughby, T. F.* | *"The Golden Stream"* | *96* | |
| 212 | *Eccles, C. H.* | *"Dairy Cattle and Milk Production"* | *14* | *1 28 net* |
| 213 | *Sheldon, J. P.* | *"The Farm and Dairy"* | *97* | *90 net* |
| 214 | *Montgomery, E. G.* | *"Corn Crops"* | *14* | *1 28 net* |
| 215 | *Harper, M. W.* | *"Management and Breeding of Horses"* | *15* | *2 00 net* |
| 216 | *Plumb, C. S.* | *"Beginnings in Animal Husbandry"* | *17* | *1 25 net* |
| 217 | *Wilson, A. D., et al.* | *"Field Crops"* | *17* | *1 50 net* |
| 218 | *Hunt, T. F., et al.* | *"Farm Animals"* | *15* | *1 50 net* |
| 219 | *Washburn, R. M.* | *"Productive Dairying"* | *19* | *1 75* |
| 219.1 | *Gay, C. W.* | *"Productive Horse Husbandry"* | *19* | *1 75* |
| 219.2 | *Curtis, R. S.* | *"Live Stock Judging and Selection"* | *105* | |
| 219.3 | *Eccles and Warren* | *"Dairy Farming"* | *14* | *88 net* |
| 219.4 | *Gay, C. W.* | *"Principles and Practice of Judging Live Stock"* | *14* | *1 20 net* |
| 219.5 | *Montgomery, E. G.* | *"Productive Farm Crops"* | *19* | *1 75* |

### B. Fruit Growing

(See also references under (3), B)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 220 | Bailey, L. H . . . | " The Nursery Book " . . . . . | 14 | $1 50 net |
| 221 | Bailey, L. H. . . . | " The Principles of Fruit Growing " | 14 | 1 50 net |
| 222 | Bailey, L. H. . . . | " The Pruning Book " . . . . . | 14 | 1 50 net |
| 232 | Thomas, J. J. . . . | " The American Fruit Culturist " . | 15 | 2 50 net |
| 233 | Waugh, F. A. . . . | " The American Apple Orchard " . | 15 | 1 00 net |
| 234 | Wolverton, L. . . . | " The Canadian Apple Grower's Guide " . . . . . | 43 | 2 00 net |
| 235 | *Waugh, F. A. . . .* | *" Beginner's Guide to Fruit Growing "* | *15* | *75* |
| 236 | *Beach, S. A., et al.* . | *" The Apples of New York,"* I . . . | *100* | *2 25 net* |
| 237 | *Beach, S. A., et al.* . | *" The Apples of New York,"* II . . | *100* | *set* |
| 238 | *Waugh, F. A. . . .* | *" The American Peach Orchard "* . . | *15* | *1 00* |
| 239 | *Sears, F. C. . . .* | *" Productive Orcharding "* . . . . | *19* | *1 75* |
| 240 | *Favor, E. H. . . .* | *" Fruit Grower's Guide "* . . . . . | *105* | |
| 241 | *Kains, M. G. . . .* | *" Principles and Practice of Pruning "* | *15* | *2 00* |

### C. Market Gardening

(See also references under (3) A)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 250 | Bailey, L. H. . . . | " The Forcing Book " . . . . . | 14 | $1 25 net |
| 251 | Beattie, W. R. . . | " Celery Culture " . . . . . | 15 | 50 |
| 254 | Rawson, Herbert . . | " Success in Market Gardening " . . | 16 | 1 10 |
| 257 | Taft, L. R. . . . . | " Greenhouse Construction " . . . | 15 | 1 50 |
| 258 | Taft, L. R. . . . . | " Greenhouse Management " . . . | 15 | 1 50 |
| 259 | *Lloyd, J. W. . . .* | *" Productive Vegetable Growing "* . . | *19* | *1 75* |
| 260 | *Corbett, L. C. . . .* | *" Garden Farming "* . . . . . | *29* | *2 00* |
| 261 | *Yeaw, F. L. . . .* | *" Market Gardening "* . . . . . | *36* | *75 net* |
| 262 | *Watts, R. L. . . .* | *" Vegetable Forcing "* . . . . . | *15* | |

## (5) — FOR LABORATORY EXERCISES AND SCIENTIFIC DATA BEARING UPON THE PRODUCTIVE PROJECTS UNDERTAKEN

Intended to be supplementary to the entries above given, and to be drawn upon as occasion permits or demands

### A. Agriculture in General

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 270 | Bailey, L. H. | "Cyclopedia of American Agriculture: Farms," Vol. I | 14 | 05 00 net |
| 271 | Bailey, L. H. | "Cyclopedia of American Agriculture: Crops," Vol. II | 14 | 5 00 net |
| 272 | Bailey, L. H. | "Cyclopedia of American Agriculture: Animals," Vol. III | 14 | 5 00 net |
| 273 | Bailey, L. H. | "Cyclopedia of American Agriculture: Farm and Community," Vol. IV | 14 | 5 00 net |
| 274 | Bailey, L. H. | "Farm and Garden Rule Book" | 14 | 2 00 |
| 275 | Bailey, L. H. | "Principles of Agriculture" | 14 | 1 25 net |
| 276 | Bailey, L. H. | "Principles of Vegetable Gardening" | 14 | 1 50 net |
| 278 | Brooks, W. P. | "Agriculture: Soils," Vol. I | 44 | 1 25 |
| 279 | Brooks, W. P. | "Agriculture: Manures, Fertilizers and Farm Crops," Vol. II | 44 | 1 25 |
| 280 | Brooks, W. P. | "Agriculture: Animal Husbandry" | 44 | 1 25 |
| 281 | Davenport, E. | "Domesticated Animals and Plants" | 29 | 1 00 net |
| 285 | Goodrich, C. L. | "The First Book of Farming" | 16 | 1 00 net |
| 286 | Hunt, T. F. | "The Cereals in America" | 15 | 1 75 |
| 287 | Hunt, T. F. | "Forage and Fibre Crops in America" | 15 | 1 75 |
| 289 | Massey, W. F. | "Practical Farming" | 91 | 1 50 net |
| 290 | Voorhees, E. B. | "First Principles of Agriculture" | 46 | 60 net |
| 292 | Wilcox, E. V. | "Farmers' Cyclopedia of Agriculture" | 15 | 3 50 |
| 294 | *Hopkins, C. G., et al.* | *"For Better Crops"* | *96* | |
| 295 | *Bowsfield, C. C.* | *"Making the Farm Pay"* | *98* | *1 00 net* |
| 296 | *Livingstone, G.* | *"Field Crop Production"* | *14* | *1 12 net* |
| 297 | *Piper, C. V.* | *"Forage Plants and Their Culture"* | *14* | *1 40 net* |
| 298 | *Hitchcock, A. S.* | *"The Text-Book of Grasses"* | *14* | *1 20 net* |
| 299 | *Snyder, Alva* | *"Fights of the Farmer"* | *19* | *1 25* |

### B. Animal Diseases

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 313 | Mayo, N. S. | "Diseases of Animals" | 14 | $1 50 net |
| 318 | Reynolds, M. H. | "Veterinary Studies for Agricultural Students" | 14 | 1 75 net |
| 323 | Salmon, D. E. | "Diseases of Poultry" | 47 | 60 net |
| 326 | *Craig, R. A.* | *"Common Diseases of Farm Animals"* | *19* | *1 75* |

### C. Animal Foods and Feeding

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 341 | Henry, W. A. | "Feeds and Feeding" | 49 | $2 00 net |
| 344 | Jordan, W. H. | "The Feeding of Animals" | 14 | 1 50 net |
| 347 | Shaw, Thos. | "Feeding Farm Animals" | 15 | 2 00 |
| 350 | *Woll, F. W.,* | *"Productive Feeding of Farm Animals"* | *19* | *1 75* |
| 351 | *Burkett, C. W.* | *"First Principles of Feeding Farm Animals"* | *15* | *1 50* |
| 352 | *Larson, C. W., et al.* | *"Dairy Cattle Feeding and Management"* | *36* | *2 50 net* |

### D. Animal Life, Propagation and Tests

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 360 | Kellogg, V. L. | "Animals" | 51 | $1 80 net |
| 361 | Jordan, D. S., *et al.* | "Animal Studies" | 51 | 1 25 net |
| 363 | Punnett, R. C. | "Mendelism" | 14 | 1 25 |
| 364 | Shaw, Thos. | "Animal Breeding" | 15 | 1 50 |
| 366 | *Peabody and Hunt.* | *"Elementary Biology — Animal and Human"* | *14* | *90 net* |
| 367 | *Marshall, F. R.* | *"Breeding Farm Animals"* | *31* | *1 50* |
| 368 | *Walter, H. E.* | *"Genetics"* | *14* | *1 20 net* |

### E. Bacteriology, Agricultural

(See also references below under J)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 370 | Conn, H. W. . . . | "Agricultural Bacteriology" . . . | 53 | $2 00 net |
| 371 | Conn, H. W. . . . | "Bacteria in Milk and Its Products" | 53 | 1 50 net |
| 372 | Conn, H. W. . . . | "Practical Dairy Bacteriology" . . | 15 | 1 25 |
| 376 | Lipman, J. G. . . . | "Bacteria in Relation to Country Life" . . . . . | 14 | 1 50 net |
| 378 | *Russell, H. L., et al.* . | *"Experimental Dairy Bacteriology"* . | 29 | |
| 379 | *Russell, H. L., et al.* . | *"Agricultural Bacteriology"* . . . . | 109 | 1 25 |

### F. Birds and Agriculture

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 387 | Forbush, E. H. . . | "Useful Birds and Agriculture" . . . | 114 | |
| 389 | *Washburn, F. L.* . | *"Injurious Insects and Useful Birds"* . | 19 | |
| 394 | | | | |

### G. Botany and Plant Physiology

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 395 | Andrews, E. F. . . | "Practical Course in Botany" . . | 54 | $1 00 net |
| 396 | Bergen, J. Y., *et al.* . | "Practical Botany" . . . . . | 29 | 1 04 net |
| 397 | Coulter, J. M. . . | "Plant Structures" . . . . . | 51 | 1 20 net |
| 398 | Duggar, B. M. . . | "Plant Physiology" . . . . . | 14 | 1 60 net |
| 399 | Percival, J. . . . . | "Agricultural Botany" . . . . . | 34 | 2 50 net |
| 400 | Stevens, W. C. . . | "Introduction to Botany" . . . | 55 | 1 50 net |
| 401 | *Atkinson, G. F.* . . | *"Botany"* . . . . . | 34 | 1 32 |
| 402 | *Bailey, L. H.* . . . | *"Botany for Secondary Schools"* . . | 14 | 1 00 net |
| 403 | *Robbins, W. W.* . . | *"Botany of Crop Plants"* . . . . | 53 | 2 00 net |

## H. Chemistry and Agriculture

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 405 | Hart, E. B., *et al.* | "General Agricultural Chemistry" | 56 | $1 50 |
| 406 | Storer, F. H. | "Agriculture in Some of Its Relations with Chemistry," Vol. I | 57 | |
| 407 | Storer, F. H. | "Agriculture in Some of Its Relations with Chemistry," Vol. II | 57 | 5 00 |
| 408 | Storer, F. H. | "Agriculture in Some of Its Relations with Chemistry," Vol. III | 57 | |
| 409 | Warington, R. | "The Chemistry of the Farm" | 58 | 1 13 |
| 410 | Williams, R. P. | "Elements of Chemistry" | 29 | 88 net |
| 411 | *Kahlenberg, L., et al.* | *"Chemistry and Its Relations to Daily Life"* | 14 | *1-00 net* |
| 412 | *Keith, T. E.* | *"The Chemistry of Farm Practice"* | 36 | *1 25 net* |
| 413 | *Brownlee, R. B., et al.* | *"Chemistry of Common Things"* | 107 | *1 50* |

## I. Construction and Repairs: Plans, Materials, Tests, etc.

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 418 | Cobleigh, R. | "Handy Farm Devices" | 15 | $1 50 net |
| 419 | Breeders' Gazette | "Farm Buildings" | 33 | 2 00 |
| 422 | Davidson and Chase | "Farm Buildings" | 92 | 2 00 |
| 423 | Fiske, G. B. | "Poultry Appliances and Handicrafts" | 92 | 50 |
| 424 | Fiske, G. B. | "Poultry Architecture" | 92 | 50 |
| 425 | Hasluck, P. N. | "Harness Making" | 92 | |
| 426 | Hasluck, P. N. | "Knotting and Splicing" | 92 | |
| 427 | Hasluck, P. N. | "Saddlery" | 92 | |
| 429 | Holmstrom, J. G. | "Standard Blacksmithing, Horseshoeing and Wagon Making" | 17 | 50 |
| 430 | Orange Judd Co. | "Barn Plans and Out Buildings" | 15 | 1 00 |
| 432 | Stabler, A. L. | "Hog Houses, Description" | 52 | |
| 439 | *Brace, G. M., et al.* | *"Farm Shop Work"* | 54 | *1 00* |

### J. Dairy Products, Manufactures, Chemistry, and Bacteriology

(See also references above under E)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 448 | Farrington and Woll | "Testing Milk and Its Products" | 60 | $1 25 |
| 451 | Van Slyke, L. L. | "Modern Methods of Testing Milk and Milk Products" | 15 | 75 |
| 454 | Wing, H. H. | "Milk and Its Products" | 14 | 1 50 net |
| 455 | *Snyder, H.* | *"Dairy Chemistry"* | 14 | *80 net* |
| 456 | *Barthel, C.* | *"Milk and Dairy Products"* | 14 | *1 80 net* |
| 457 | *McKay and Larson* | *"Principles and Practice of Butter Making"* | 36 | *1 50 net* |
| 458 | *Russell, H. L., et al.* | *"Dairy Bacteriology"* | 109 | *1 00* |

### K. Farm Management, and Rural Economics

Accounts, Statistics, etc.

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 465 | Card, F. W. | "Farm Management" | 16 | $2 00 net |
| 467 | Carver, T. N. | "Principles of Rural Economics" | 29 | 1 04 net |
| 489 | Hunt, T. F. | "How to Choose a Farm" | 14 | 1 58 |
| 492 | Roberts, I. P. | "The Farmer's Business Handbook" | 14 | 1 25 |
| 493 | Roberts, I. P. | "The Farmstead" | 14 | 1 50 |
| 499 | Taylor, H. C. | "Agricultural Economics" | 14 | 1 25 |
| 500 | Terry, T. B. | "Our Farming, or, How We Have Made a Run-down Farm Bring Both Profit and Pleasure" | 63 | 75 |
| 524 | Warren, G. F., *et al.* | "Laboratory Exercises in Farm Management" | 14 | 80 |
| 526 | Wing, J. E. | "Alfalfa Farming in America" | 33 | 2 00 |
| 527 | Woll, F. W. | "Handbook for Farmers and Dairymen" | 36 | 1 50 |
| 528 | Green, J. B. | "Law for the American Farmer" | 14 | 1 50 |
| 529 | *Boss, A.* | *"Farm Management"* | 102 | *90* |

### L. Fruits

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 540 | Bailey, L. H. . . . | "The Evolution of our Native Fruits" . . . . . | 14 | $2 00 |
| 542 | Waugh, F. A. . . . | "Systematic Pomology" . . . . | 15 | 1 00 |

### M. Insects

(See also references above under F)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 550 | Chittenden, F. H. . | "Insects Injurious to Vegetables" . | 15 | $1 50 |
| 551 | Comstock, J. H., *et al.* | "Manual for the Study of Insects" . | 65 | 3 75 net |
| 558 | Sanderson, E. D. . | "Insect Pests of Farm, Garden and Orchard" . . . . . | 36 | 3 00 |
| 559 | Saunders, Wm. . . | "Insects Injurious to Fruits" . . . | 19 | 2 00 net |
| 560 | Smith, John . . . | "Our Insect Friends and Enemies" | 19 | 1 50 net |
| 562 | Weed, C. M. . . . | "Life Histories of American Insects" | 14 | 1 50 |
| 563 | *Sanderson, E. D., et al.* | *"School Entomology"* . . . . . | *36* | *1 50 net* |
| 564 | *O'Kane, W. C.* . . | *"Injurious Insects"* . . . . . | *14* | *1 60 net* |

### N. Lime and Liming

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 574 | | | | |
| 575 | | | | |
| 576 | | | | |

## O. Physics of Agriculture

### Drainage, Irrigation, Machines, Motors, etc.

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 580 | Davidson, J. B., *et al.* | "Farm Machinery and Farm Motors" | 15 | $2 00 net |
| 581 | Elliott, C. G. | "Practical Farm Drainage" | 36 | 1 50 |
| 585 | ~~King~~, F. H. | "~~Irrigation and Drainage~~" | 14 | 1 50 |
| 586 | King, F. H. | "Physics of Agriculture" | 66 | 1 75 |
| 588 | Powell, F. E. | "Wind Mills and Wind Motors" | 92 | 50 |
| 590 | *Davidson, J. B.* | "*Agricultural Engineering*" | *17* | *1 50* |
| 591 | *Anderson, F. I.* | "*Electricity on the Farm*" | *14* | *1 20 net* |
| 592 | *Wirt, F. A.* | "*Farm Machinery*" | *36* | *1 25 net* |

## P. Plant Diseases

(See also Spraying)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 602 | Massee, Geo. | "A Text-book of Fungi" | 14 | $2 00 |
| 605 | Stevens, F. L., *et al.* | "Diseases of Economic Plants" | 14 | |
| 607 | *Duggar, B. M.* | "*Fungous Diseases of Plants*" | *29* | *2 00* |

## Q. Plant Foods and Feeding

(See also Soils, etc.)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 615 | Aikman, C. M. | "Manures and Manuring" | 67 | $2 50 |
| 619 | Cameron, F. K. | "The Soil Solution" | 68 | 1 25 net |
| 622 | Johnson, S. W., | "How Crops Feed" | 15 | 1 50 |
| 623 | Myers, W. S. | "Food for Plants" | 69 | |
| 633 | Voorhees, E. B. | "Fertilizers" | 14 | 1 25 |
| 634 | *Halligan, J. E.* | "*Soil Fertility and Fertilizers*" | *68* | *3 50 net* |
| 635 | *Van Slyke, L. L.* | "*Fertilizers and Crops*" | *15* | *2 50* |
| 636 | *Wheeler, H. J.* | "*Manures and Fertilizers*" | *14* | *1 28 net* |

## R. Plant Life, Propagation and Tests

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 645 | Bailey, L. H. | "Plant Breeding" | 14 | $1 25 |
| 647 | Beal, W. J. | "Seed Dispersal" | 29 | 35 |
| 649 | Coulter, J. M. | "Plant Studies" | 51 | 1 25 |
| 651 | Gray, Asa | "How Plants Grow" | 54 | 64 net |
| 654 | Johnson, S. W. | "How Crops Grow" | 15 | 1 50 |
| 658 | MacDougall, D. T. | "The Nature and Work of Plants" | 14 | 80 |
| 661 | Masters, M. T. | "Plant Life on the Farm" | 15 | 1 00 |
| 662 | Osterhout, W. J. V. | "Experiments with Plants" | 14 | 1 25 |
| 667 | Spillman, W. J. | "Farm Grasses of the United States" | 15 | 1 00 |
| 668 | Sutton & Sons | "Culture of Vegetables and Flowers from Seeds and Roots" | 72 | 1 25 net |
| 671 | *Peabody and Hunt* | *"Elementary Biology. Plants"* | *14* | *64 net* |
| 672 | *Sargent, F. L.* | *"Plants and Their Uses"* | *34* | *1 32* |

## S. Soils, Geology, Physical Geography, Soil Fertility

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 681 | Burkett, C. W. | "Soils" | 15 | $1 25 |
| 682 | Davis, W. M. | "Elementary Physical Geography" | 29 | 1 00 net |
| 683 | Fletcher | "Soils" | 16 | 2 00 net |
| 685 | Gilbert, G. K. | "An Introduction to Physical Geography" | 51 | 1 25 net |
| 687 | King, F. H. | "The Soil" | 14 | 1 50 |
| 688 | McCall, A. G. | "The Physical Properties of Soils" | 15 | 50 net |
| 689 | Merrill, G. P. | "Rocks, Rock-weathering and Soils" | 14 | 4 00 |
| 691 | Roberts, I. P. | "The Fertility of the Land" | 14 | 1 50 |
| 692 | Snyder, H. | "Soils and Fertilizers" | 14 | 1 25 |
| 696 | Tarr, R. S. | "Elementary Geology" | 14 | 1 40 |
| 697 | Vivian, A. | "First Principles of Soil Fertility" | 15 | 1 00 net |
| 699 | *Lyon, T. L., et al.* | *"Soils"* | *14* | *1 52 net* |
| 700 | *Hunt, T. F., et al.* | *"Soils and Crops"* | *15* | *1 50* |
| 701 | *Whitson, A. R., et al.* | *"Soils and Soil Fertility"* | *17* | *1 25 net* |
| 702 | *Mosier, J. G., et al.* | *"Soil Physics and Management"* | *19* | |

### T. Spraying and Fumigation

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 718 | Johnson, Willis G. | "Fumigation Methods" | 15 | $1 00 |
| 719 | Lodeman, E. G. | "The Spraying of Plants" | 14 | 1 25 |
| 732 | Weed, C. M. | "Insects and Insecticides" | 15 | 1 50 |

### U. Textbooks and Manuals for Schools

#### Agricultural

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 745 | Barto, D. A. | "Manual of Agriculture, Soils and Crops" | 55 | $ 50 net |
| 746 | Bricker, G. A., *et al.* | "Agricultural Words" | 74 | 05 |
| 747 | Burkett, Stevens, and Hill | "Agriculture for Beginners" | 29 | 60 net |
| 749 | Coulter, J. M., *et al.* | "Practical Nature Study and Elementary Agriculture" | 51 | 1 35 |
| 752 | Davis, C. W. | "Rural School Agriculture" | 15 | 1 00 |
| 753 | Davis, K. C. | "Productive Farming" | 19 | 1 00 |
| 754 | Duggar, J. F. | "Agriculture for Southern Schools" | 14 | 75 |
| 756 | Field, Jessie | "Farm Arithmetic" | 76 | 15 |
| 757 | Fisher and Cotton | "Agriculture for Common Schools" | 57 | 1 00 |
| 758 | Fream, W. | "Elementary Agriculture" | 21 | 1 25 net |
| 759 | Goff, E. S., *et al.* | "First Principles of Agriculture" | 54 | 1 64 net |
| 760 | Halligan, J. E. | "Fundamentals of Agriculture" | 55 | 25 net |
| 761 | Hatch and Haselwood | "Elementary Agriculture" | 77 | 50 |
| 762 | Hays, W. M. | "Farm Development" | 15 | 1 50 net |
| 764 | Hodge, C. F. | "Nature Study and Life" | 29 | 1 20 net |
| 767 | Jackson and Daugherty | "Agriculture through the Laboratory and School Garden" | 15 | 1 50 net |
| 768 | James, C. J. | "Practical Agriculture" | 51 | 80 net |
| 770 | McLennan, J. | "Manual of Practical Farming" | 14 | 1 50 |
| 772 | Nolan, A. W. | "One Hundred Lessons in Agriculture" | 77 | 65 |
| 773 | Shaw, E. E. | "Gardening" | 16 | 1 |
| 774 | ~~Shoesmith, V. M.~~ | ~~"The Study of Corn"~~ | 15 | 50 net |
| 775 | Soule and Turpin | "Agriculture: Its Fundamental Principles" | 78 | 75 |
| 776 | ~~Stevens, F. L., *et al.*~~ | ~~"A Practical Arithmetic"~~ | 57 | 65 |
| 777 | Upham, A. A. | "An Introduction to Agriculture" | 51 | 75 net |

[1] A volume in the "Library of Work and Play," for sale only as a complete set of ten volumes at $ 17.50.

**U. Textbooks and Manuals for Schools — *Continued***

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 779 | Weed, C. M. | "Farm Friends and Farm Foes" | 55 | $ 90 net |
| 780 | Weed, C. M., *et al.* | "The School Garden Book" | 57 | 1 25 |
| 781 | Wilkinson, J. W. | "Practical Agriculture" | 54 | 80 net |
| 782 | Wilson, A. D., *et al.* | "Agriculture for Young Folks" | 17 | 1 00 |
| 784 | Comstock, A. B. | "Handbook of Nature Study" | 65 | 3 65/net |
| 784.1 | *Davis, K. C.* | *"Productive Plant Husbandry"* | 19 | |
| 785 | *Burkett, C. W., et al.* | *"Farm Arithmetic"* | 15 | *1 00* |
| 785.1 | *Lewis, C. J.* | *"Farm Business Arithmetic"* | 55 | *48* |
| 785.2 | *Shutts, G. C., et al.* | *"Agricultural Arithmetic"* | 17 | *80 net* |
| 785.3 | *Stallon, W. T., et al.* | *"Agricultural Arithmetic"* | 14 | *40 net* |
| 786 | *Budd, J. L., et al.* | *"American Horticultural Manual," Part I* | 36 | *1 50 net* |
| 786.1 | *Budd, J. L., et al.* | *"American Horticultural Manual," Part II* | 36 | *1 50 net* |
| 787 | *Call, L. E., et al.* | *"A Laboratory Manual of Agriculture"* | 14 | *72 net* |
| 788 | *Stebbins, C. A.* | *"The Principles of Agriculture Through the School and Home Garden"* | 14 | *80 net* |
| 789 | *Calfee, J. E.* | *"Rural Arithmetic"* | 29 | *30* |
| 789.1 | *Ross H. E.* | *"A Dairy Laboratory Guide"* | 15 | *60 net* |
| 789.2 | *Nida, W. L.* | *"Elementary Agriculture." Teacher's Edition with "Appendix: One Thousand Questions Answered"* | 101 | *75* |
| 789.3 | *Cluie, W. N.* | *"Agronomy: A Course in Practical Gardening for High Schools"* | 29 | *1 00* |
| 789.4 | *French, A.* | *"Beginner's Garden Book"* | 14 | *80 net* |
| 789.5 | *Weed, C. M., et al.* | *"Crop Production"* | 55 | *88* |
| 789.6 | *Agee, Alva* | *"Crops and Methods for Soil Improvement"* | 14 | *1 20 net* |
| 789.7 | *Davis, K. C.* | *"School and Home Gardening"* | 19 | *1 28* |
| 789.8 | *Dadisman, S. H.* | *"Exercises in Agriculture"* | 102 | *60* |
| 789.9 | *Gehrs, J. H., et al.* | *"One Hundred Exercises in Agriculture"* | 14 | *88 net* |

**V. Trees and Shrubs**

**Not for Fruit**

| | | | | |
|---|---|---|---|---|
| 791 | Blakeslee, A. F., *et al.* | "Trees in Winter" | 14 | |
| 793 | Gifford, John | "Practical Forestry" | 51 | $1 20 |
| 807 | *Levison, J. J.* | *"Studies of Trees"* | 36 | *1 60 net* |

### W. Weeds and Their Eradication

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 821 | Pammel, L. H. . . | " Weeds of the Farm and Garden " . | 15 | $1 50 net |
| 823 | *Georgia, Ada* . . . | " *Manual of Weeds* " . . . . . | *14* | *1 60 net* |

### X. Zoölogy, General and Economic

(See also above Reference Numbers 360, 361)

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 850 | Linville, H. R., *et al.* | " A Text-book in General Zoölogy " | 29 | $1 20 net |
| 831 | Osborne, H. . . . | " Economic Zoölogy " . . . . . | 14 | 2 00 |

## (6) — FOR BETTERMENT OF COUNTRY LIFE AND EDUCATION

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 836 | Anderson, W. L. . . | " The Country Town " . . . . . | 80 | $1 00 |
| 837 | Bailey, L. H. . . . | " The Country-life Movement in the United States " . . . . . | 14 | 1 25 net |
| 838 | Bailey, L. H. . . . | " The State and the Farmer " . . . | 14 | 1 25 net |
| 839 | Bailey, L. H. . . . | "The Training of Farmers " . . . | 81 | 1 00 net |
| 840 | Seton, E. T., *et al.* . | " Boy Scouts of America " . . . . | 16 | 30 |
| 841 | Brewer, I. W. . . . | " Rural Hygiene " . . . . . | 19 | 1 25 |
| 842 | Bricker, G. A. . . . | " The Teaching of Agriculture in the High School " . . . . . | 14 | 1 00 |
| 843 | Buell, Jennie . . . | " One Woman's Work for Farm Women " . . . . . | 82 | 50 net |
| 844 | Butterfield, K. L. . | " Chapters in Rural Progress " . . | 83 | 1 00 net |
| 845 | Butterfield, K. L. . | "The Country Church and the Rural Problem " . . . . . | 83 | 1 08 |
| 846 | Davenport, E. M. . | " Education for Efficiency " . . . | 55 | 1 00 net |
| 847 | Davis, Benj. M. . . | " Agricultural Education in the Public Schools " . . . . . | 83 | 1 00 net |

**(6)—FOR BETTERMENT OF COUNTRY LIFE AND EDUCATION** — *Continued*

| Reference Number | Author | Title | Publisher | Price |
|---|---|---|---|---|
| 848 | Dodd, Helen | "The Healthful Farmhouse" | 82 | $60 net |
| 850 | Fullerton, E. L. | "The Lure of the Land" | 84 | |
| 851 | Gerhard, W. P. | "Sanitation, Water Supply and Sewage Disposal of Country Houses" | 85 | 2 00 net |
| 852 | Greene, M. L. | "Among School Gardens" | 86 | 1 25 |
| 853 | Hall, Bolton | "Three Acres and Liberty" | 14 | 1 75 |
| 854 | Harris, H. T. | "Health on the Farm" | 87 | 75 |
| 861 | Kern, O. J. | "Among Country Schools" | 29 | 1 00 net |
| 862 | King, F. H. | "Farmers of Forty Centuries" | 66 | 2 50 |
| 863 | King, F. H. | "Ventilation for Dwellings, Rural Schools and Stables" | 66 | 75 |
| 866 | McKeever, W. A. | "Farm Boys and Girls" | 14 | 1 50 |
| 867 | Miller, M. R. | "Outdoor Work" | 16 | [1] |
| 869 | Plunkett, Sir H. | "The Rural Life Problem of the United States" | 14 | 1 25 |
| 870 | Robertson, J. W. | "Macdonald Movement for Rural Education and Other Addresses" | 88 | |
| 871 | ~~Robison, C. H.~~ | "Agricultural Instruction in the Public High Schools of the United States" | 89 | |
| 873 | Snedden, David | "The Problem of Vocational Education" | 90 | 35 net |
| 876 | Williams, Dora | "Gardens and Their Meaning" | 29 | 80 net |
| 878 | *Hunt, T. F.* | *"The Young Farmer"* | *15* | *1 50* |
| 879 | *Saint Maur, K.* | *"A Self-Supporting Home"* | *14* | *1 40 net* |
| 880 | *Savage, W. G.* | *"Milk and the Public Health"* | *14* | *2 60 net* |
| 881 | *Gillette, J. M.* | *"Constructive Rural Sociology"* | *87* | *1 75* |
| 882 | ~~*Hummel, W. G., et al.*~~ | *"Materials and Methods in High School Agriculture"* | *14* | *1 00 net* |
| 883 | *Bolte, J. W.* | *"The Back Yard Farmer"* | *98* | *1 00 net* |
| 884 | *Cromwell, A. D.* | *"Agriculture and Life"* | *19* | *1 48* |
| 884.1 | *Nolan, A. W.* | *"The Teaching of Agriculture"* | *90* | |
| 885 | *Hall-Quest, A. L.* | *"Supervised Study"* | *14* | *1 00 net* |
| 886 | *Lapp, J. A., et al.* | *"Learning to Earn"* | *108* | |
| 887 | *Foght, H. W.* | *"The Rural Teacher and His Work"* | *14* | |
| 888 | *Eaton, T. H.* | *"A Study of Organization and Methods of the Course of Study in Agriculture in Secondary Schools"* | *113* | |
| 889 | *Peabody, F. G.* | *"Education for Life"* | *16* | *2 65* |

[1] A volume in the "Library of Work and Play"; for sale only as a complete set of ten volumes at $17.50.

## 5. Publishers and Their Addresses [1]

14. The Macmillan Company, 64 Fifth Avenue, New York City.
15. The Orange Judd Company, 315–321 Fourth Avenue, New York City.
16. Doubleday, Page & Company, Garden City, New York.
17. Webb Publishing Company, St. Paul, Minn.
18. William Henry Maule, 1707 Filbert Street, Philadelphia, Pa.
19. J. B. Lippincott Company, Washington Square, Philadelphia, Pa.
20. John Lane Company, New York City.
21. John Murray, London, Eng.
23. The A. I. Root Company, Medina, O.
24. American Poultry Association, Morgan Park, Ill.
25. David McKay, Philadelphia, Pa.
26. Michael K. Boyer, Hammonton, N. J.
27. The Torch Press, Cedar Rapids, Ia.
28. Edward Arnold Company, London, Eng.
29. Ginn & Company, 15 Ashburton Place, Boston, Mass.
30. Cassell & Company, Limited, London, Eng., 354–360 Fourth Avenue, New York City.
31. The Breeders' Gazette, Chicago, Ill.
32. J. E. Wing, Mechanicsburg, O.
33. Sanders Publishing Company, 542 South Dearborn Street, Chicago, Ill.
34. Henry Holt & Company, 6 Park Street, Boston, Mass.
35. The Bullard Company, 46 Cornhill, Boston, Mass.
36. John Wiley & Sons, New York City.
37. Frederick A. Stokes Company, 443 Fourth Avenue, New York City.
38. J. A. Craig, Omaha, Neb.
40. John Michels, West Raleigh, N. C.
43. William Briggs, Toronto, Can.
44. The Home Correspondence School, Springfield, Mass.
45. The Outing Publishing Company, New York City.
46. Silver, Burdett & Co., 221 Columbus Avenue, Boston, Mass.
47. The Feather Publishing Company, Washington, D. C.
49. W. A. Henry, Madison, Wis.
51. D. Appleton & Co., 35 West 32d Street, New York City.
53. P. Blakiston's Son & Co., 1012 Walnut Street, Philadelphia, Pa.
54. American Book Company, 63 Summer Street, Boston, Mass.
55. D. C. Heath & Company, 50 Beacon Street, Boston, Mass.
56. State Journal Printing Company, Madison, Wis.
57. Charles Scribner's Sons, 153 Fifth Avenue, New York City.
58. Vinton & Co., London, Eng.
60. Mendota Publishing Company, Madison, Wis.
63. The Farmer Company, Philadelphia, Pa.
65. Comstock Publishing Company, Ithaca, N. Y.
66. Mrs. F. H. King, Madison, Wis.

[1] Numbers to 13 represented sources of bulletin and circular reference materials listed in this project study bibliography in its original form, but omitted from this chapter owing to doubt as to their present availability. Other missing numbers, — 22, 39, etc., — referred to similar sources.

67. Wm. Blackwood & Sons, London, Eng.
68. The Chemical Publishing Company, Easton, Pa.
69. Wm. S. Myers, New York City.
72. Simpkin, Marshall & Co., London, Eng.
74. The Ohio Association for the Advancement of Agricultural Education, Columbus, O.
75. Middlebury College, Middlebury, Vt.
76. Henry Field Seed Company, Shenandoah, Ia.
77. Row, Peterson & Co., Chicago, Ill.
78. B. F. Johnson Publishing Company, Richmond, Va.
80. The Baker & Taylor Company, 33 East 17th Street, New York City.
81. The Century Company, Union Square, New York City.
82. Whitcomb & Barrows, Huntington Chambers, Boston, Mass.
83. University of Chicago Press, Chicago, Ill.
84. Long Island Railroad Company, Medford, Long Island.
85. D. Van Nostrand Company, 25 Park Place, New York City.
86. Charities Publication Committee, 105 East 22d Street, New York City.
87. Sturgis & Walton Company, New York City.
88. James W. Robertson, Chairman, Royal Commission on Industrial Training and Technical Education, Box 540, Ottawa, Can.
89. Teachers College, Columbia University, New York City.
90. Houghton Mifflin Company, 4 Park Street, Boston, Mass.
91. A. C. McClurg & Co., Chicago, Ill.
92. Manual Arts Press, Peoria, Ill.
93. Spon & Chamberlain, 123–125 Liberty Street, New York City.
94. Howard Publishing Co., Washington, D. C.
95. Farm Poultry Pub. Co., Boston, Mass.
96. International Harvester Co., Harvester Building, Chicago, Ill.
97. G. Bell & Sons, Ltd., York House, Portugal St., Kingsway, London, Eng. The Macmillan Company are the American Agents for this house. (See 14 above.)
98. Forbes & Co., 443 So. Dearborn Street, Chicago, Ill.
99. Wilmer Atkinson Co., Philadelphia, Pa.
100. Department of Agriculture, Commissioner of Agriculture, Albany, N. Y.
101. A. Flanagan Company, 521 Wabash Avenue, Chicago, Ill.
102. Lyons & Carnahan, New York City.
103. James J. H. Gregory, Marblehead, Mass.
104. *Rural New Yorker*, 333 West 30th Street, New York City.
105. *The Fruit Grower*, St. Joseph, Mo.
106. Lea & Febiger, New York City and Philadelphia.
107. Allyn & Bacon, Boston, New York, Chicago.
108. Bobbs-Merrill Company, Indianapolis, Ind.
109. H. L. Russell, Madison, Wis.
110. Frank Kleinheinz, Madison, Wis.
111. American School of Poultry Husbandry, Leavenworth, Kan.
112. Moffatt, Yard & Co., New York.
113. Teachers College, Columbia University, New York City.
114. Massachusetts Board of Agriculture, State House, Boston.

## CHAPTER VI

### COUNTY SCHOOLS AND HIGH SCHOOL DEPARTMENTS IN THE MASSACHUSETTS NO-DORMITORY SYSTEM COMPARED AS TO REQUIREMENTS AND ADVANTAGES[1]

THE Massachusetts system of vocational agricultural education includes separate schools and departments in high schools. In the

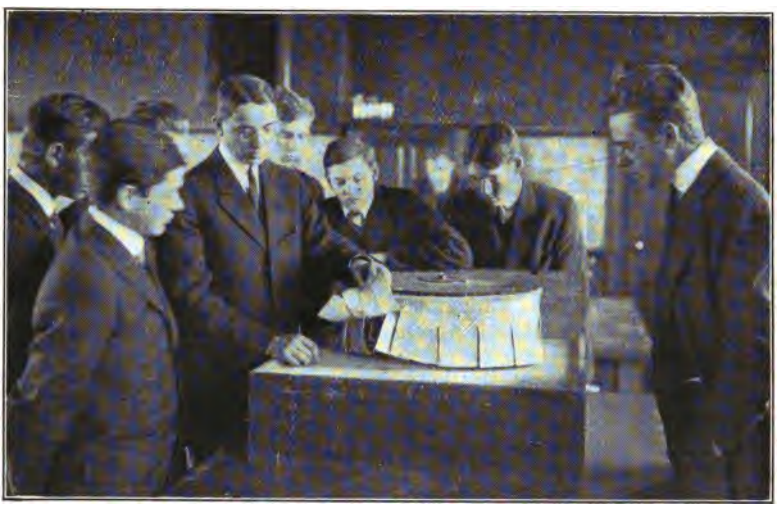


FIG. 115. — Boys are taught various methods of artificial incubation and brooding. Brooder parts and their purposes. "Related Study" at School. Concord Agricultural Department.

case of a school, the state pays one-half the maintenance expenses; in the case of a department, two-thirds the salary of the agricultural

[1] Most of this chapter stating features still in force, first appeared in 1916, in Bulletin No. 72 of the Massachusetts Board of Education, a bulletin not available for unlimited distribution outside the state. The parallel column plan of presentation was suggested by Deputy Commissioner R. O. Small.

instructor. The State bears no part of the cost of plant and equipment. There is not a dormitory in this system. In all cases, the work centers on productive projects thoroughly studied and carefully planned at school, but carried out, with supervision throughout the producing season by the agricultural instructors, occasionally

FIG. 116.—"School Project." Coal stove brooder house built by these boys. Later operated by boys without facilities for home projects. Essex County Agricultural School.

at a school or on the farm of an employer, but as a rule on the home farms of the pupils.

Each school and department is being developed as a separate unit, suited in its service to the needs of the farming and community life of its particular vicinity. The county schools have, nevertheless, certain characteristics in common; so, also, have the high school departments; while there are certain factors which are common to both schools and departments.

The following statements and comparisons, aided in several instances by parallel columns, are intended to throw into clear relief, for those interested in, or responsible for the administration of, this type of education, certain requirements and advantages of both schools and departments.

## 1. Authorization

(1) **Chapter 471 of the Acts of 1911** states the policy of this Commonwealth which governs the establishment and maintenance of state-aided vocational agricultural education. This is the fundamental law upon which subsequent authorizations of this type of training have been based. This law vests approval of schools and departments in the Board of Education.[1]

(2) **But this act is not sufficient authorization** for the entering upon this type of training by a county or a school committee. Further legal procedure is necessary. Following is the procedure which the Board prefers:

### A. County School

(A) **State legislation** is necessary, in which provision is made for a special board of trustees, bond issues to cover first cost of land, buildings, and equipment, and a tax levy to meet the cost of maintenance during the first year.

The entire cost during the first year must be met by the county, since state aid is restricted to one-half the "net maintenance sum," and consists of reimbursement for approved expenses.

Seventy-five thousand dollars to $100,000 for the first cost of establishment and $16,000 to $20,000 for the first year of maintenance may be regarded as reasonable estimates.

### B. High School Department

(A) **No further State legislation is** necessary.

The entire cost during the first year must be met by the town or city, since state aid is restricted to reimbursement for two-thirds of the amount paid the approved agricultural instructor or instructors as salary.

One thousand five hundred dollars for the first year may be regarded as a moderate estimate, — $1200 or thereabouts for salary and the balance for special agricultural supplies and equipment. Two thousand five hundred dollars would not be too much in some cases.

[1] Chapter 215 of the Acts of 1917 accepts the provisions of the "Smith-Hughes" Act applicable to this state and designates the Board of Education as the state board to cooperate with the Federal Board for Vocational Education.

**(B) County referendum.** — The special acts of the Legislature have made the schools dependent upon favorable referendum votes at the November elections in the counties concerned.

This feature insures proper publicity. A favorable vote indicates that public sentiment has been aroused, that public opinion has been informed, and that the school will both meet a public need and receive public support.

**(B) Local ordinance** is required. The Board of Education has ruled that, in the interests of good local government and good school administration, a vote should be passed by the city council or by the town meeting authorizing the school committee to undertake the responsibilities of a department.

## 2. Control

The controlling boards of county schools and departments differ as indicated below, but have this in common, that each must designate an executive officer with whom the Board of Education shall officially communicate.

### (1) County school

**A. Board of trustees.** — The special acts of the Legislature vest control of schools in boards of trustees independent of public schools.

Three trustees consist of the county commissioners *ex officiis*. Four are appointed by the Governor. Each Board thus has seven members.

The trustees serve without pay, but are reimbursed for their necessary traveling expenses.

**B. Director is executive officer.** — The Board of Trustees designates the director of the school as its executive officer.

**C. Records.** — Minutes of all meetings of the trustees are carefully made and kept for future reference.

Immediately after each meeting a copy of the minutes is forwarded to the Board of Education.

### (2) High school department

**A. School committee.** — Chapter 471 of the Acts of 1911 and local ordinances have invariably vested control of departments in school committees.

**B. Superintendent is executive officer.** — The school committee designates the superintendent of schools as its executive officer.

**C. Records.** — The school committee may transact business relating to the agricultural department at meetings where other business receives attention; but it is required to keep in one place, for convenient reference, a separate and complete record of all its acts which affect the agricultural department.

### 3. Organization

(1) **Coöperation with Educators.** — Both schools and departments work in coöperation with the Massachusetts Agricultural College and the United States Department of Agriculture. All joint undertakings, such as promotion of club work, making of farm management surveys, demonstrations of improved methods of farming, are covered by written memoranda of agreement with the director of the Extension Service of the College, as the joint representative of the College and the United States Department of Agriculture. Instructors in

FIG. 117. — "School" project. Group instruction indoors. Boys building another type of portable poultry house. Anything that can be taken out of a big barn can be taken out of this Arena. Work goes on rain or shine, snow or blow. Smith School, Northampton.

departments coöperate closely with the farm bureaus in their counties. Our law provides that there shall not be county-aided farm bureaus in counties where there are county agricultural schools. County schools, themselves, maintain farm bureau departments which are affiliated with the other farm bureaus of the state and the work of which is done in coöperation with the Extension Service. Our schools and departments, also, coöperate with other agencies, private and public, including the Patrons of Husbandry and the state departments of Forestry and Agriculture.

Thus, we feel that in Massachusetts we shall soon have a smooth-running and efficient plan of organization of all our various activities

in agricultural education, Federal, State, County, and Local. We are undertaking to avoid overlapping of functions and needless duplication in expenditures of public funds. The author, as State Supervisor of vocational agricultural education, has made it business of the first importance to promote such coöperation.

(2) **Coöperation with Farmers.** — Of course we feel that little could be accomplished through the coöperation of educators without the heartiest and closest possible coöperation between them and practical farmers. Wherever there is a department or a school, our

FIG. 118. — "Trial" project. Individual instruction. Frame furnished by boy. Patent covering furnished by Instructor Doolittle. If satisfactory, this covering will be recommended to others. Project of Willard Hemenway, 17, on his home farm. Concord Agricultural Department.

law requires that an advisory committee of farmers shall be appointed to advise with and assist the administrative officers and the instructors in charge of this work. School projects are important for illustrating approved methods and providing convenient facilities for group teaching in observational and practice work; but more and more are we emphasizing home projects, not merely because home

projects are an aid to keeping the study of agriculture from being too bookish, but because each project generally becomes a demonstration in its neighborhood of a better method of farming than is commonly followed in that vicinity, and because things done by farmers on their

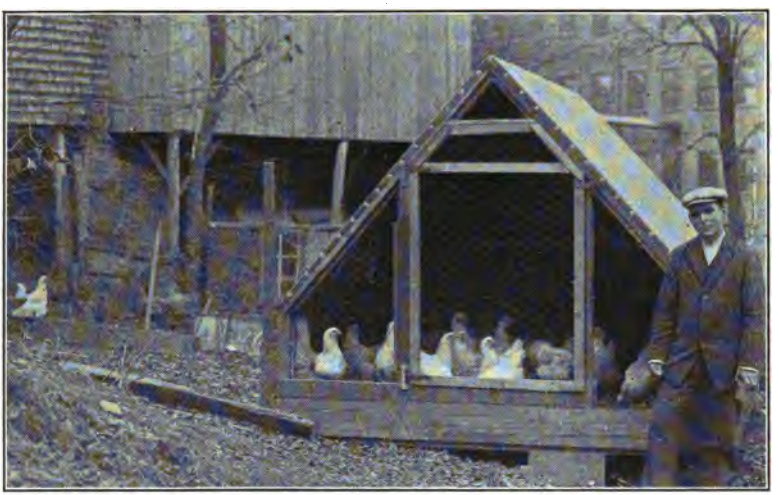


FIG. 119. — Village boy's second-year project. Made poultry house and yard. In back yard shown in Figures 81 and 82. Yielded him $35.44. North Easton Agricultural Department.

own farms are usually more convincing to farmers as to the value of improved methods than are things done on the premises of a school.

Dr. H. J. Waters, in the preface to his recent book, " The Essentials of Agriculture," says:

"In no way is it possible for the school to serve the local community more successfully than through instruction in agriculture. This may be best accomplished through the utilization of the facilities of the neighborhood as a laboratory. The gardens, orchards, and farms, and, indeed, the gardeners and farmers themselves, should be utilized to the fullest extent. By this means the school and the community are brought into the closest relations, and there is awakened among the farmers a lively interest in the work of the school."

There is a superlative in every sentence of this statement. But our experience in Massachusetts since the beginning of our home-

projects efforts in 1908 leads us to believe that, at every point, his declarations are warranted.

(3) **The following plan of organization,** under the boards of control above named, has the approval of the Board of Education. It provides for the distinctive management of schools and departments,

FIG. 120. — This boy also worked during second season as assistant gardener on a large estate near by, thus gaining invaluable experience under best conditions. Work with animals always supplemented by continued work in crop production. This boy now in Massachusetts Agricultural College. North Easton Agricultural Department.

with important adaptations to the needs of each. It outlines the work of the advisory committees which the law requires boards of control to appoint " to counsel with and advise " them concerning the efficient training of their agricultural pupils; and provides for farm bureau work. It also provides for " professional improvement."

### (4) County school

**A. Director.** — The trustees adopt rules under which a paid officer called director is appointed and made their executive officer for the administration of the school, and not merely for the purpose above stated of official communication between the trustees and the Board of Education.

### (5) High school department

**A. Superintendent of schools.** — The superintendent of schools is the executive officer of the school committee in the administration of a department, and not merely for the purpose above stated of official communication between his committee and the Board of Education.

FIG. 121. — William Smith's mangel wurzel beets for his poultry. Feeds for poultry are thoroughly studied and crops for them are grown. Concord Agricultural Department.

The director's duties include nomination for appointment by the Board of Trustees of all instructors and other subordinate officers. In choosing the director, the Board of Trustees confer with the agricultural representative of the Board of Education, following the plan of " approval in advance."

" Approval in advance " means that the Board of Education, having given its approval to the choice of a man, will assume joint responsibility with the trustees for the capable performance of his duties. Pending formal notice from the Board of Edu-

The duties of the superintendent of schools include nomination of teachers.

The agricultural instructor is chosen because of his liking for country life, his demonstrated ability in practical farming, his salutary influence upon boys and young men fourteen to twenty-five years of age, and his special qualifications for the teaching and supervision of home-farm projects.

The superintendent of schools, prior to nominating an agricultural instructor, confers with the agricul-

cation of withdrawal of approval, it is assumed by the Board of Trustees that final approval at the end of any fiscal year will be granted, and reimbursement for expenses incurred in the employment of school officers will be recommended to the Legislature by the Board of Education.

The director is selected because of special qualifications for service as advisor to the trustees in the administration of the type of education the school represents; and instructors are chosen because of their appreciation of the requirements of vocational education and their special qualifications for bringing education to bear in the training of pupils by home-farm projects.

tural representative of the Board of Education, following the plan of "approval in advance."

The superintendent assumes responsibility for all instruction given, and for making the records and reports required by the Board of Education.

FIG. 122. — William Smith himself. Father is superintendent of a large farm. Besides his projects, which owner permitted, he worked on the farm. Entire farm earnings in 1914, along with good work in school, $699.08. Since, has taken Short Course at Massachusetts Agricultural College. Concord Agricultural Department.

The director, prior to nominating instructors and other subordinates, confers with the agricultural representative of the Board of Education, following the plan of "approval in advance."

Adequate clerical assistance for the director is required.

The director is responsible for all instruction given, for the efficient conduct of the school, and for making the records and reports required by the Board of Education.

**B. Staff of specialists.** — The school employs a staff of specialists, larger or smaller in number, depending upon the enrollment of pupils.

One hundred pupils in a school warrant a considerable degree of specialization among instructors. For example, one instructor may devote his entire time to the teaching of dairying; another, fruit growing; another, poultry keeping; and another, gardening.

With a small enrollment, instructors who teach the specialties above

**B. Agricultural instructor or instructors.** — The agricultural instructor is responsible for the conduct and the efficient agricultural training of the pupils in his department.

A department may employ more than one special agricultural instructor, depending upon the enrollment of pupils.

An instructor in a department must have an all-round knowledge of farm work and of the sciences applicable thereto. If there are two agricultural instructors in a department, a

FIG. 123. — Caponizing. Pupil operating. Essex County Agricultural School.

named may be called upon to teach such subjects as English, current and local history, civics, drawing, agricultural chemistry, agricultural physics, agricultural biology and farm-shop work. Where the number of pupils is greater, special teachers for the subjects last named may be employed, thus enabling the agricultural instructors to devote themselves to their specialties.

Specialists must be capable of cooperation in farm bureau work with adult farmers.

**C. Advisory committee. (A) Make-up.** — The advisory committee of a school generally numbers at least fifteen, including one or two women, of the best practical farmers.

FIG. 124. — Ralph Anderson, brother of Le Roy, shown in Figures 87 and 88, same year younger brother was conducting gardening projects, designed and built this house for his poultry project at home. A thoroughly workmanlike job. Ashfield Agricultural Department.

degree of specialization is possible and desirable.

An agricultural instructor is not permitted to teach non-agricultural subjects, but may teach agricultural chemistry, physics, biology, or mathematics.

Ability to coöperate in farm bureau work with adult farmers is of fundamental importance. Through such work the instructor comes to know the farming of his vicinity as he could not otherwise hope to do; and no man can be expected to teach farming in a community unless he knows the farming of that community.

**C. Advisory committee. (A) Make-up.** — The advisory committee of a department is made up of the best practical farmers, varying

The plan of one school provides for a chairman and two other members from each town and city of the county.

The committee must be composed of employers and employees.

Responsive to the spirit of the times, which is bringing farmers and business men together for the working out of problems of production and distribution of farm products, one school has appointed a supplementary advisory committee of business men to coöperate with the advisory committee of farmers in the management and supervision of its farm bureau department.

The director is expected to meet with the advisory committee; also other members of his staff, when invited to do so.

Advisory committee members serve without pay, but are reimbursed for their necessary traveling expenses.

from five to fifteen in number, from the neighborhoods from which pupils are expected.

The committee must be composed of employers and employees.

Each committee usually has at least one woman member, if there is a capable woman farmer in the vicinity; and often the secretary of the committee is a woman.

The superintendent of schools and the special agricultural instructor are expected to meet with the committee, unless requested not to do so on some particular occasion.

The advisory committee members serve without pay, and are generally under no expense for travel since they usually live near the department.

**(B) Duties of the advisory committee, for either a school or a department**, may be of two kinds:

**a. Formal duties.** **(a) Organization, officers, committees, minutes.** — An advisory committee usually organizes for business with a chairman and a secretary. In some cases standing committees are appointed, such as committees on dairying, fruit growing, and the like. Record of the attendance at meetings and of the action taken is kept.

**(b) Acquaintance with policy and staff of the school.** — A committee may meet once a month or once in two months. Members may be assigned to visit the school in turn, and to report their impressions of the policy of the school and the efficiency of the individual members of the staff at meetings of the full committee. A director or agricultural instructor may be invited to sit with the whole committee or with a standing committee. The members are busy people and generally without experience in teaching. Perhaps their best service is rendered when directors and instructors take the initiative

in pointing out problems confronted and difficulties to be overcome. Committee members are urged to visit and pass judgment upon the home project or other agricultural work of the pupils.

(c) **No reports or recommendations are official until voted by a majority and transmitted in writing by the secretary to the trustees or school committee in charge.**

**b. Informal duties.** (a) **Friendly consultation** with the instructors and the controlling board.

(b) **Making favorably known** the work and aims of the school or department.

**D. Branches of county schools.** — The county school may be so organized that part of its instruction shall be given at a small central

FIG. 125. — Glimpses of the poultry plant in which the Essex County School is now conducting its third annual egg-laying contest open to birds of various breeds owned by residents of the county. Pupils built the houses and yards and are studying the contest from all angles. Good for the boys and good for the county.

school and part near the homes of the more distant pupils in branches consisting of one- or two-teacher agricultural departments in high schools.

**E. Farm bureau department.** — The law authorizing county aid for certain corporations, such as farm bureaus or improvement leagues,

**F. Farm bureau coöperation.** — The agricultural instructors, as they make their rounds of home-project supervision among the farms of their

1915

**State of Rhode Island**

Board of Control and Supply

State House
Providence, R. I.

Order No. 2355

THIS NUMBER MUST APPEAR ON ALL INVOICES AND SHIPMENTS.

Req. No. 560

MAIL INVOICE IN DUPLICATE TO THE OFFICE OF THE BOARD OF CONTROL AND SUPPLY IMMEDIATELY UPON SHIPMENT OF GOODS. STATE TERMS AND DISCOUNT

**PURCHASE ORDER**

Date Feb. 18, 1915

To Mr. Ralph W. Williams,
Harwich, Mass.

Please deliver to

STATE SANATORIUM
WALLUM LAKE, R. I

| | |
|---|---|
| 750 | Eggs for incubator to be delivered March 24th |
| 750 | " " " " " " April 14th |

**SINGLE COMB WHITE LEGHORNS**
Half English—Large, Vigorous Layers.
Baby Chicks—$15 hundred
Hens, 3, 4 and 5—$6 hundred, $1 Saving
Hens, 1 and 2 - $6 hundred, $1.50 Saving
PINE GROVE POULTRY FARM
RALPH W. WILLIAMS, Harwich

SPECIAL ORDER

Pine Grove Poultry Farm

FIG. 126. — Ralph W. Williams and his first big order for hatching eggs. Entered Agricultural College, fall of 1918, with over $1000 earned from home projects. For his report see pages 439–440. Note his advertisement pasted on order, lower left side. Home projects mean business, sometimes pretty big business. Harwich Agricultural Department.

which are organized not for profit but for the betterment of farming, prohibits such county-aided corporations in counties where there are county agricultural schools. The Legislature obviously intended to prevent expenditure of public funds upon overlapping, competing, or conflicting agencies.

Certainly the county school is expected to do everything in its territory for the betterment of farming which State and Federal agencies are not prepared to do. Each gives both extension service and vocational education.

Each county school, accordingly, maintains a farm bureau department.

The broad obligations of the Norfolk County Agricultural School with reference to the work of its farm bureau department were stated in the act providing for its maintenance, as follows: "Members of the school staff shall investigate farm and market conditions for the purpose of advising individuals and organizations with reference to better business methods among farmers and more satisfactory methods of marketing farm products, shall give instruction in the formation of coöperative enterprises, and shall perform any other work calculated to promote the agricultural or rural development of the county. It shall be the duty of the staff to keep in touch with, and to bring to their assistance, all agencies in the commonwealth or elsewhere that will enable them to utilize the latest and best knowledge in the furtherance of their work." The other county schools work under like legislation.

o

pupils, become acquainted with adult farmers. The farm bureau type of service is expected of them by the taxpayers who are contributing to their support, and they render it to the extent that they can do so without interference with the proper performance of their primary duties as instructors of pupils regularly enrolled in their classes.

There are farm bureaus in all counties where there are agricultural departments in high schools. In fact, some of the departments have been started as the direct results of farm bureau work. The instructors in their out-of-school work with adult farmers coöperate with the farm bureaus. Division of labor and economy of time and travel thus result.

The broad obligations of the farm bureaus which receive county aid are identical with those of the farm bureau department of the county agricultural school as stated in the column opposite hereto. And, first or last, the coöperative activities of the agricultural instructors are equally broad.

Thus State and Federal agencies not only are brought in when their help is needed, but their advice is followed up by the instructors in its application to the conditions of individual farms.

The benefits are reciprocal. In return for their assistance, both the practical farmers and the county agents help the agricultural instructors.

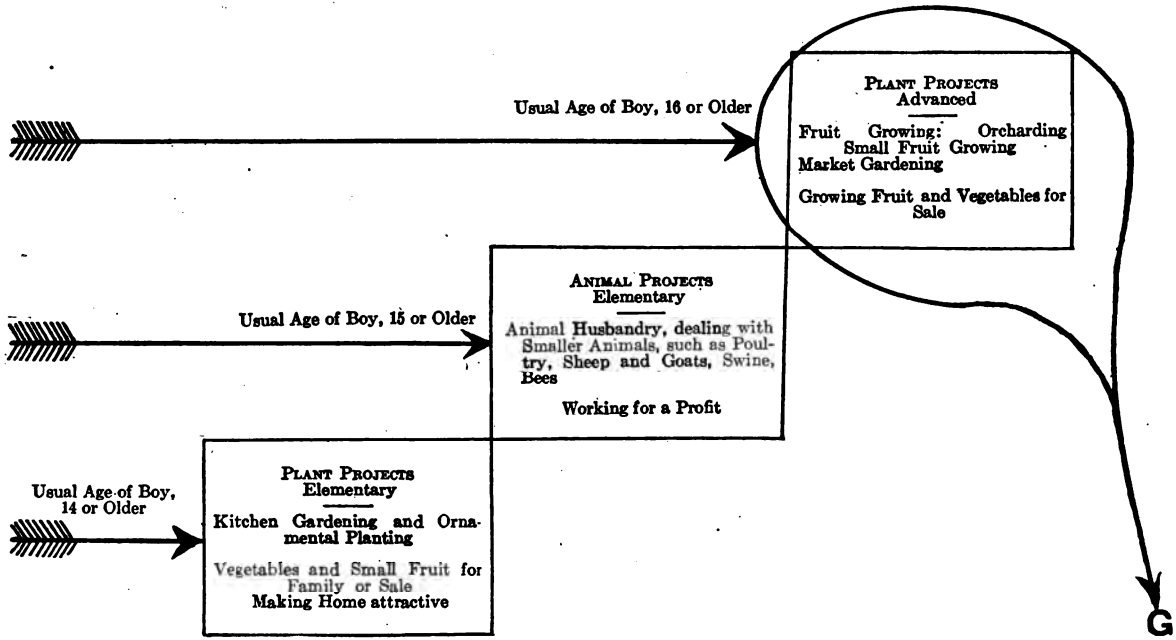



FIG. 127. — Third-year projects, for schools in all years and for departments in even years, focus again upon plant production. The boy is now nearly man-grown, and ready for really big projects. His father has now had time and opportunity to test the common sense and ability of the instructor in farming matters. The time is ripe for many undertakings. Two important fields are here opened, that of the long term development project in fruit growing and the quick turnover project in market gardening or other cash crop growing. High school graduates and other over-age boys often are admitted to third- or fourth-year project instruction, and are helped to get right down to the ground with it. Other boys may continue independently projects begun in first and second years.

**G. Program: Time allotment for day pupils. (A) The county school** is required to provide instruction fifty weeks each year, including the summer supervision of productive farm work. No program of a school is approved which does not give at least 80 per cent and not more than 90 per cent of the whole time allotment to vocational instruction. At least 50 per cent of the whole time allotment, including the summer, must be given to project study and work, and the rest of the time allotment up to the minimum of 80 per cent must be given to study definitely related to the productive work. Not more than 20 per cent of the whole time allotment may be given to general education; and at least 10 per cent of the whole time — namely, one-half of the whole time allotment to general education — must be

FIG. 128. — George Walcott, 17. Father thrifty market gardener and dairyman. Much poultry kept. Boy's 1914 farm earnings amounted to $266.19. Had home project in market gardening, taught and supervised by agricultural instructor. Boys from best farms in vocational agricultural schools and departments. Concord Agricultural Department.

given to instruction in citizenship, personal hygiene, occupational diseases and accidents. The previous sentence applies to all kinds of state-aided vocational education in Massachusetts.

**(B) The agricultural department in a high school** is required to provide instruction at least forty weeks each year, including the summer supervision of productive farm work. Fifty per cent of the whole school time allotment may be devoted to vocational instruction, and 50 per cent given to regular high school subjects. This time allotment applies to branches of county schools located at high schools.

**H. Size of classes.** — The allowance of pupils to instructor in a county school is 15 to 30, depending upon the radius of travel and the

degree of specialization. One instructor in a high school department is not permitted to teach or supervise more than 20 pupils.

Classes are not permitted to be overloaded in anticipation of dropping out pupils. When the maximum class enrollment approved for a school or a department has been reached, a waiting list from which vacancies may be filled is established.

**I. Persistency of attendance.** — When less than 75 per cent of the original enrollment in any school or department continue as members

FIG. 129. — Third-year boys may specialize in market gardening, or combine quick turnover cash crops with long-term development projects in fruit growing. A fine cabbage project at the school. Boys grew crop. Essex County Agricultural School.

throughout the course, and when the per cent of attendance in any school or department falls below 75, evidence is demanded to show reason why state aid should not be stopped. This is a general requirement which applies to all state-aided vocational schools in Massachusetts.

**J. Special efficiency corps.** — County schools of over 50 pupils are required by the general regulations governing approval of state-

aided vocational schools to establish the " functions " of " sales agent " and " educational manager," with certain adaptations to the project plan of vocational agricultural education, but with definite assignment of " efficiency corps " duties.[1]

**K. Staff "Vacation" and "Professional Improvement" provisions.** — The school or department must be so organized as to allow each director and instructor one month of vacation, and to require not less than two weeks, and not more than two months, of what, for lack of a better description, has been called " professional improvement."

FIG. 130. — Joseph Jekanowski, 16. "A real student and a real worker." Helping with the tobacco harvest at home. Farmers in the Connecticut valley specialize heavily in tobacco and onions. Hadley Agricultural Department.

Agriculture, of all professions, perhaps is the hardest to master, and of all business, the least well organized and established. No young man entering upon the teaching of agriculture can be supposed to be a master of farming, either as a profession or as a business. Nor can teaching, as such, be learned once for all.

This is emphasized in Massachusetts by the definite " professional

[1] The general regulations "as to special efficiency corps" are as follows:

*The Sales Agent.* — In all schools of over 50 pupils there shall be established a "function" of some member of the faculty, the purpose of which shall be: (*a*) To secure work for the shops. (*b*) To find a market for shop products. (*c*) To place trained pupils. (*d*) To follow up pupils. (*e*) To secure publicity and coöperation.

*The Educational Manager.* — In all schools of over 50 pupils there shall be established a "function" of some member of the faculty, the purpose of which shall be: (*a*) To promote efficient instruction. (*b*) To follow the educational and trade progress of each pupil. (*c*) To "prescribe" special work for individual pupils as their needs may require.

improvement" requirement. By "professional improvement" is meant such programs of work, observation, study, and lesson planning as shall be approved in each case from year to year by the Board of Education.

With a limited number of pupils, it has been possible to take care of the project supervision in summer by devoting about three days a week to it. In such cases, two days a week throughout the summer may be reserved for "professional improvement," and the period of absence in winter correspondingly reduced. Professional improvement time, apart from the August and December conferences which all directors and teachers are required to attend, may be in one block; or it may be divided and distributed, week by week, through the year.

FIG. 131. — Joseph Jekanowski and his brothers and sisters. Everybody works, even father, who is hanging tobacco in shed at side of field. Joseph won third prize at public speaking of Hopkins Academy in Town Hall. Participant in all "school projects," of which there are several; but works chiefly on tobacco at home. Hadley Agricultural Department.

The programs of "professional improvement" are never the same for any two instructors, and are seldom the same for one instructor any two years. This entire period has been spent by one instructor at the Massachusetts Agricultural College. For a newcomer to the state such a course affords an admirable opportunity to make first-hand acquaintance with the specialists on the college staff, and to know the doctrines they hold to be important for the improvement of Massachusetts farming. This entire period has been spent by an-

other instructor working for a market gardener, because his previous practical experience had been somewhat deficient in this field. A month of such a period has been spent by an instructor in collecting farm management data in territory served by his school, and a second month in working on the school farm, to get a better grasp of the all-round routine of practical farm management in the height of the producing season. Usually a program consisting of one month of investigation, at home or at a distance, and one month of preparation of lesson outlines and teaching materials, is to be preferred.

FIG. 132. — Joseph Jekanowski lathing tobacco. Smaller children big enough to pass him single plants. Hadley Agricultural Department.

This takes the mind of both teacher and director away, for a specified time annually, from the ordinary "chores" of instruction and administration.

This positive limitation is imposed that the department instructors and the plant project instructors in a school are not permitted to be away from their teaching and supervision of projects more than one week for vacation, and one week for professional improvement, at a time during the growing and harvesting seasons; and these two weeks must not be consecutive.

### 4. Location

The problem of locating a high school agricultural department is much simpler than is the problem of locating a county agricultural school. This will be evident from the following considerations:

### (1) County school

**A. On a farm.** — The Massachusetts plan of vocational agricultural education is a no-dormitory plan; that is to say, in the cases of schools, as in those of departments, projects conducted by pupils at their own homes are the fundamental factors in the training of pupils. All of the county schools are, however, located on farms.

Perhaps the main justification of the county school is that there are pupils from villages and cities who desire to learn farming, who have no land at home, and who can be given parts of their training on a school farm to good advantage.

### (2) High school department

**A. In a high school building.** — A department is generally located in or near the high school building.

Those departments have flourished best which have been most closely identified with the headquarters and spirit of the high school proper. Pupils generally devote one-half their time to regular high school subjects. Because the schedules provide that the high school subjects shall be taught in one half day and the agricultural in the other half day, convenience in getting from one classroom to another is a factor in favor of locating a department on the high school premises.

It is immaterial whether or not the high school has land. That is to say, projects of pupils are studied at the school, but are carried out at their

FIG. 133. — Larger children strong enough to pass lath laden with half-dozen plants. Father's forty-acre farm was bought about twenty years ago as "stump land" for $500. Not for sale now at $12,000. Father has paid $300 an acre for more land not so good as this. Father a good citizen. Hadley Agricultural Department.

**B. Accessibility.** — For the benefit of both boys who have land at home and boys who have none, the school should be located at the most easily accessible spot from the point of view of transportation.

Primary consideration should be given to selecting a site for the school which can be easily reached from the most considerable farming area.

Boarding or working places can generally be found near the school for the limited number of pupils who are without land at home and need the practice work which the routine operations of the school afford.

**C. Acreage and variety of soil.** — The land selected should be typical of the surrounding farming region, and permit of demonstrating the best methods of farming practicable for that county.

**D. One-teacher branches in high schools**, like the departments, when organized at the more distant points, may teach village boys who have only a small amount of land projects of first and second years, and promote to the county school for third- and fourth-year projects.

own homes or at the homes of other practical farmers in the vicinity.

Illustrative material and practice work are also found on neighboring farms.

One high school has a greenhouse, and the agricultural department has made good use of it.

Now and then a high school has land more or less under cultivation. Possession of land is not required for approval and state aid, and has proved to be a doubtful advantage in the cases of more than one department.

**B. Accessibility** has usually been given due consideration in locating the high school buildings.

No high school so far has been found so lacking in accessibility as to necessitate the location of an agricultural department elsewhere than in, or adjacent to, the high school building.

## 5. Equipment

There is a radical difference in the equipment requirements of schools and departments.

### (1) County school

**A. The farm** should consist of well-diversified soils and topography. Land as good as any to be found in the county should be selected, and land suited to the various farm crops and animals which can be produced in that county should be chosen. Reasons for this are obvious. It should be the aim of the school to establish the highest standards of production; that is, it should undertake to show pupils what farming is at its best. Such a policy fits into the home-

### (2) High school department

**A. No farm** is required. Farm products, methods of production, farm buildings and equipment are studied on farms in the vicinity and at the homes of the pupils. Though one high school has a greenhouse, and its agricultural department has made good use of it, some of the very best instruction is being given by departments which have no greenhouses, but which have established coöperative relations with owners of greenhouses in sections where market

FIG. 134. — Florence Jekanowski, who has hung the tobacco-laden laths on the wagon rack. Load on way to curing shed. Polish people, no less than the old settlers, are making land pay in health, happiness, and general prosperity. There is a high-priced automobile on this farm. Hadley Agricultural Department.

project plan; because boys whose home farms are producing inferior crops and animals will have standards by which their home production may be gauged, and the improvements they make from year to year may be measured. High standards thus may become not discouraging, but encouraging, factors in the training of the pupils.

The farm should not be a fancy gardening is a very important branch of farming. Practice work under economic conditions is proving to be better than practice work under school conditions, — provided the practice work in the former case is given proper educational value by study at the school, in the greenhouse, and elsewhere, of all factors involved in the production and marketing of greenhouse crops.

FIG. 135. — "Related Study." "Trial project" in tomato growing. Testing early variety. Planned by instructor, executed and observed by boys. Boys selected and cleaned seed for next trial as part of "school project." Essex County Agricultural School.

farm, — a farm where money is spent and not a farm where money is made; that is to say, the equipment should be modern and varied, but of the kind that the most practical farmer would choose. Such buildings as barns and poultry houses should be of the kind that a farmer with a moderate amount of capital would wish to erect as parts

FIG. 136. — Of course the boys everywhere promptly discover that every plant has its pests, and the battle for protection as promptly begins. See opposite page.

of a convenient, sanitary, and practical plant. Quarters for all kinds of live-stock suited to the locality should be provided. The school might or might not own all of the live-stock dealt with in classroom demonstrations. The best obtainable specimens of the breeds studied should be seen and handled, and proper accommodations for keeping them should

Three high schools have fruit trees on the school premises which are taken care of by the pupils in the agricultural departments. These afford practice work from season to season in connection with the various processes of propagating, pruning, spraying, thinning, picking, packing, and marketing.

Fruit growers, however, have been very ready to coöperate with agricultural instructors in affording pupils practice work. Several departments have conducted campaigns by pupils for eradication of nests of insects injurious to fruit, prizes being offered by local persons or organizations and by the State Board of Agriculture. Pruning and spraying campaigns have been conducted by pupils, the pupils, after attaining the proper degree of proficiency, being paid for their services by those for whom the work has been done. As many as 1200 trees have been pruned and sprayed annually by the pupils in a single department.

While pupils show interest and take pride in work done at a school, they show even greater interest and take greater pride in work they do on the premises of farmers.

Moreover, things done on farms tend to extend the influence of better methods throughout the countryside, as the limited demonstrations possible at a high school even under the best conditions cannot be made to do.

At one high school there is a pen of poultry. But it is believed that the best work has been done where instructors have introduced high-producing birds by keeping them for

make it easy to borrow or hire animals when needed. When not filled with live-stock these quarters would still be on view as models of their several kinds for housing and caring for the various types of farm animals.

A museum for collecting out-of-date farm implements and machines

themselves, thus exemplifying methods and standards for the benefit of their pupils and other interested persons; where, for illustrative purposes, visits to commercial poultry plants have been made; and where, in practice work, the boys have been taught to build their own houses and trained in competent methods

FIG. 136. *Continued.* — Advisory Committee member, demonstrating mechanism and advantages of his potato sprayer. Best farmers advise with and assist instructors. Brimfield Agricultural Department.

would serve a most excellent informational purpose. Visits to fancy farms might be made at will for purposes of observation. But the main object of the school should be to provide the best models of buildings, implements,

of poultry keeping at their own homes.

A poultry instructor's family may relieve him at times of some of the "chores" required by his own birds. It is difficult for an instructor to find

machines, and animals for use in economic and profitable production.

**B. Classrooms and their equipment.** — Libraries, laboratories, and other classrooms suitable for the study of agriculture and the various sciences related thereto, are required. The school assumes responsibility for the well-rounded education of the pupil in all matters pertaining to agriculture and country life. Classrooms are adapted to the special purposes of the school.

Equipment for the classrooms is selected because of its adaptability to training in agriculture. Submitted to the test of practical farming, much, for example, of the equipment usually found in high school science laboratories is omitted, and other equipment selected.

Water and gas are required.

The best books, bulletins, periodicals, and card-indexing systems deal-

relief from the " chores " required by the maintenance of birds at a high school, and it is observed that a poultry instructor's time can be spent to better advantage in the supervision of numerous poultry projects at the homes of his pupils than in doing poultry " chores " at the school.

Possession of a flock of birds by a high school, therefore, is not advised.

It may be an advantage for a high school that has neither land nor livestock to have a well-rounded farm equipment of hand tools, including tools for pruning, sprayers, seed sowers, wheel hoes, and the like. Pupils hard-pressed for capital may thus borrow or rent tools of the school, and save most of their money for fertilizers, spray materials, feeds, and other supplies.

**B. Classroom and its equipment.** — The special agricultural equipment of the department may be limited to a suitably appointed room for study.

Ordinary school desks are not suitable. In working out a problem in connection with a home project, it is often necessary to consult several books and bulletins. Accounting is required in connection with all projects. That is to say, more elbow room than that afforded by the ordinary school desk is required.

Flat-top desks or table space measuring about 2½ by 3 feet per pupil best meet the needs of the agricultural room.

An equipment for the study of soils and plants brought from the homes of the pupils is also desirable. There should be a Babcock tester.

ing with agricultural subjects are available.

About 20 per cent of the time of the pupil may be devoted to non-agricultural subjects, such as English, current history, and civics. Suitable reference materials dealing with these subjects are part of the equipment of the school.

The agricultural classroom generally presents the appearance of a combination of classroom and science laboratory.

Water and gas are highly desirable.

FIG. 137. — Vincent Dunn, a city boy with agricultural bent and tillage land in suburbs. Good teamster. Fine judge of live-stock. Second in state championship contest. Won total of $65 in 1914 judging at fairs. Hauling home his potatoes. Marlborough Agricultural Department.

The best books, bulletins, periodicals, and card-indexing systems dealing with agricultural subjects are available.

Fifty per cent of the time of the pupil in the department may be devoted to non-agricultural subjects. The textbook, reference book, and other supplies required for this instruction of the agricultural pupils is not estimated as part of the expense of the vocational agricultural department, but is chargeable to high school work proper.

**C. Examples. Smith Agricultural School, Northampton.** — The main school building, library facilities, classrooms, laboratories, and farm shops best designed and equipped for vocational agricultural school purposes probably are those of the Smith Agricultural School, Northampton. Though not established by the county, this school is of the type of the county school in its location and appointments, and serves the purposes of such a school for the greater part of Hampshire County.

The soil of the school farm is well diversified, typical of the farming land in its vicinity, and affords practice work and facilities for demonstrations in all branches of farming except termed landscape forestry. The lawns afford practice work for group instruction in grading, also in planting and caring for ornamental shrubbery.

Ashfield is at the end of a stage line high in the hills to the west of the Connecticut River. Agricultural pupils are in attendance from several surrounding towns. Pupils furnish their own conveyances or walk distances covering a radius from the school of about five miles.

**C. Examples. a. Ashfield.** — The department in Ashfield is located in Sanderson Academy, which institution serves as the local high school.

Attractive wooded knolls in the rear afford some opportunity for group instruction in what might be

FIG. 138. — Vincent Dunn's potato sorter. Believer in labor saving devices, and all-round hustler. Potatoes yielded at rate of almost even 400 bushels per acre. Entire farm earnings in 1914 when 15 years old, $223.72. Now in Massachusetts Agricultural College. Agricultural Instructor Brouson, who taught him stock-judging, etc., at left. Marlborough Agricultural Department.

dairying. Dairying at this school is taught by home projects. The Massachusetts Agricultural College, only a few miles away by electric cars, affords abundant dairy equipment, including specimens of the leading dairy breeds, for observation purposes; and those pupils who plan to specialize in dairying take the dairy short course at the college in the winter of the senior year as part of the requirement for graduation.

This school has an equipment of horses, poultry, swine, and bees. It conducts operations with these animals, and also in vegetable growing, ornamental planting, fruit growing, forestry, and production of general farm crops. Particularly noteworthy are its farm-shop equipment and its arena for practical demonstrations and public exhibitions.

The farms of the vicinity, supplemented by occasional trips to farms at a distance, including that of the Massachusetts Agricultural College, afford illustrative material for the observational phases of the instruction. The group instruction of pupils in practice work is done on neighboring farms. The instruction centers here, as everywhere, on the projects of the individual pupils, and these are conducted, almost without exception, on the home farms of the pupils in this very good farming section. Dealers have coöperated by lending tools and machines, even including a power sprayer shipped from a distance at no cost to the department.

The initial enrollment was 17. No addition to the academy building was required and no additional land.

FIG. 139. — George and William Freeman had a partnership project in market gardening on father's large farm. Made hotbed, and made and glazed sash for it. Made cold frame to fit storm window-sash. Wove straw mat in device made for weaving such mats at school. First hotbed on the farm. Brimfield Agricultural Department.

It is located on the electric car line at the best transportation center in Hampshire County, has about 100 acres of land, accommodates about 150 pupils, of whom about one-third are agricultural, and has cost, for plant and equipment, about $110,000.

**b. Bristol County Agricultural School, Segreganset,** is best equipped with live-stock and farm tools for general farming operations. It has a herd of pure-bred and high-grade Ayrshire cattle. It has a plank frame storage and horse barn and a modern dairy stable with silos and root cellar connected.

Besides cows and horses, it has poultry, swine, and bees. It conducts operations with these various farm animals; also, general farming operations, including vegetable growing. The initial equipment outlay did not exceed $200.

**b. Hadley.** — The department in Hadley is located in Hopkins Academy, which institution serves the town as a high school.

The academy has a few acres of land and hired a small, adjacent, rundown orchard. This land has furnished opportunity for some group instruction in gardening, fruit growing, poultry-house construction, hotbed making, and ornamental planting. A dilapidated shed has been repaired and somewhat remodeled by the agricultural pupils for a storeroom for

FIG. 140. — An empty wagon but a full pocket. George was the salesman, — "a born salesman," his instructor said. He brought home $368.59 for produce grown by William and himself. Off mare worked all summer and raised good draft colt at left. This was the team used in marketing. Brimfield Agricultural Department.

ing, ornamental planting, fruit growing, and forestry.

This school is located within a few steps of an electric car line. The Segreganset station of the double-track steam railway line between Taunton and Fall River is at its door.

spraying apparatus and materials, mixing of commercial fertilizers, and the like.

Here, again, the instruction of the pupils is centered on their home projects. Conditions, of course, are favorable, since the department is in

FIG. 141. — "Yes," the boys said they had bank books. One said he had accounts in two banks; the other, in three. George is now married and at home with his father. William has found employment elsewhere. (See, also, Figures 139 and 140.) Brimfield Agricultural Department.

It has about 100 acres of land, its new school building will accommodate 100 pupils, and it has cost, for plant and equipment, $80,000.

one of the most fertile parts of the Connecticut valley. Landowners near have coöperated. Notable instances have been the employment of pupils for pruning and spraying fruit trees. It is the department at Hadley that has commonly pruned and sprayed a thousand or more trees in a season. Hopkins Academy is about halfway between Smith Agricultural School and the Massachusetts Agricultural College. Pupils participate in the notable meetings of both of these institutions, and find the illustrative equipment, including all kinds of live-stock, at the College even more convenient of access

than do the pupils of the Smith School.

The department sometimes draws pupils from neighboring towns. In the main the department serves only the town of Hadley.

No land in addition to that possessed by the Academy, excepting the leased orchard the income from which will offset its rental, and no additional classroom space were required for the establishment of the agricultural department.

It has had an enrollment of 20 pupils. The outlay for special agricultural equipment, including the remodeling and repairing of the shed, probably has not exceeded $300.

**c. Essex County Agricultural School,** at first in makeshift quarters, now has a modern vocational school building.

It is located on an electric car line and near a steam railway station at a

**c. Reading.** — The department at Reading is located in the high school building.

The high school has no land for productive purposes, and only a limited amount of lawn. No addition

FIG. 142. — Bloom and Johanson partnership project in their home city of Lynn.

point readily reached from all parts of the county.

Its barns were once used for a model dairy farm with special facilities for steam sterilizing of utensils, cooling and bottling milk. Its dairying is taught, however, chiefly through home projects of pupils and observation of high-bred dairy cattle within easy reach of the school.

FIG. 143. — Visited by their classmates. Proud to show their project and to explain their methods. Making such statements as, "Here is some lettuce we put in Aug. 1st. Before that, we took off a crop of beans that netted us $30." Essex County School.

Its land is well adapted to diversified farming, and it is developing operations in vegetable growing, ornamental planting, fruit growing, and forestry. It also has sheep, swine, bees, and poultry. Just now it is conducting a noteworthy egg-laying contest in model buildings erected by the pupils, with rations and care which are believed to be most economical and efficient.

to the high school was necessary in order to accommodate the agricultural department. The agricultural classroom is an excellent model as a combination of study room and laboratory; and is supplemented by a good room for farm-shop work.

Here, as elsewhere, instruction is centered upon the home projects of the pupils. Transportation facilities are excellent, and the department serves a considerable farming and suburban area. Most of the practice work is done at the homes of the pupils. Trips of observation are made to well-equipped farms. Dealers coöperate by lending various agricultural appliances for observation and study. This department owns very little equipment used in productive farm work. It has an

It has about 100 acres of land, before the war accommodated 200 pupils, of whom 170 were agricultural, and has cost, for plant and equipment $185,000.

**d. Norfolk County Agricultural School** has not completed its buildings and equipment. It has a main school building of modified arena design, and a special poultry building for laboratory and other class instruction.

It is located at the geographical center of the county, on an electric car line, on the main automobile road from Boston to Providence, and near a steam railway station.

exceptional agricultural laboratory equipment and has been assigned one of the most attractive ground-floor classrooms in the building.

The enrollment is 20, and the initial outlay for equipment was about $1000.

**d. Concord.** — The department at Concord occupies the ground floor of the Ripley Building, a two-story structure adjacent to the high school grounds. Besides a small hallway, there are a large study and laboratory room, a smaller study room, a smaller laboratory and an office.

The high school has no land for tillage. The school grounds afford a limited amount of practice work in ornamental planting.

EARNINGS REPORT FOR THE YEAR 1917, Messrs. Bloom & Johanson

of the Essex County Agricultural School

These students are partners in Vegetable Gardening, Area 75,100 sq. ft.

Ages: Ernest Bloom, 18; Roy Johanson, 17.

Time covered by project: Mar. 1 to Nov. 1.

Inventories:

| | |
|---|---|
| Beginning of Project | $ 17.50 |
| End of Project | 183.75 |

Paid Selves for labor, 3,024 hours at 15¢ per hour, 453.60
of which $150.00 was cash

Expenditures and Receipts:

| | | |
|---|---|---|
| Total Expenses (Inventory, all labor, etc.) | | 1,027.28 |
| Total Receipts ( " , prizes, etc.) | | 1,327.75 |
| Net Profit | | 300.47 |
| Gross Profit, including amount paid selves for labor | | 754.07. |
| of which $150.00 was cash, as above stated. | | |

Chief source of gain: Tomatoes, Beets, Carrots.

No other work than Farm Work.

FIG. 144. — Earnings Report for the Year 1917 of Bloom and Johanson. Such reports for all pupils are filed annually with the State Supervisor of Agricultural Education.

This school is notable for having undertaken to keep the central school small and to support it at distant points in the county by one-teacher branches in high schools. The central school at Walpole and the first branch at Weymouth were opened simultaneously.

Its land, about forty acres, is well diversified, but especially suited to market gardening, fruit growing, and poultry keeping. It has horses and small animals. The outlay for plant and equipment has been about $80,000.

Concord is a fertile section suited to diversified farming. Market gardening and fruit growing, however, predominate.

This is one of the schools that has established noteworthy coöperative arrangements with owners of greenhouses for practice work in growing market-garden crops under glass. Observation trips are made to other types of farms. This department owns considerable practical farm equipment, such as pruning tools, hand sprayers, and poultry appliances. Some of the best home-project work in the state is being done by this department.

No additional land or classroom space had to be provided by the high school in order to accommodate this department.

This has been a two-teacher de-

FIG. 145. — Two "hired men" at left. Bloom and Johanson in center. Their agricultural instructor at right. For the "story" of Bloom and Johanson, see pages 434 to 435. Essex County Agricultural School.

partment, the enrollment having increased the second year from 20 to 36.

The outlay for special equipment, including classroom furniture, probably has not exceeded $1500. This amount includes the cost of a Ford touring car purchased by private subscriptions collected by the advisory committee of farmers in order that, as the secretary of that committee said, more of the time for advisory work, which had been found to be of utmost value, might be "spent on farms and less between farms."

### 6. Courses of Study

In both schools and departments, one-half the school day is devoted to project study and project work. The ratio of work to study varies from time to time and from season to season, according to the requirements of the projects which are in preparation or under way. Except occasional meetings, there is no formal classroom instruction from the time of closing the schools in June until their opening in September. All pupils, however, keep accurate bookkeeping accounts and make written reports on their projects at the end of the season. Stimulated by frequent supervision, they are keen eyed and observant, and, in some ways, the summer, when class work is suspended, is the most important teaching season of the year. Department pupils are encouraged to continue their regular high school studies through the entire school year, from September to June.

Pupils in departments of high schools may devote one-half of their time to regular high school subjects. Pupils in the separate or county schools have English every year, and give attention to such subjects as history, civics, agricultural economics, drawing, hygiene, physical training, and music, on one hand; and, on the other hand, to a continuous line of development in scientific studies, such as biology of farm plants, biology of farm animals, agricultural botany, agricultural chemistry, and farm drawing. Because the staff of the separate or county school is selected with special reference to the purpose of this

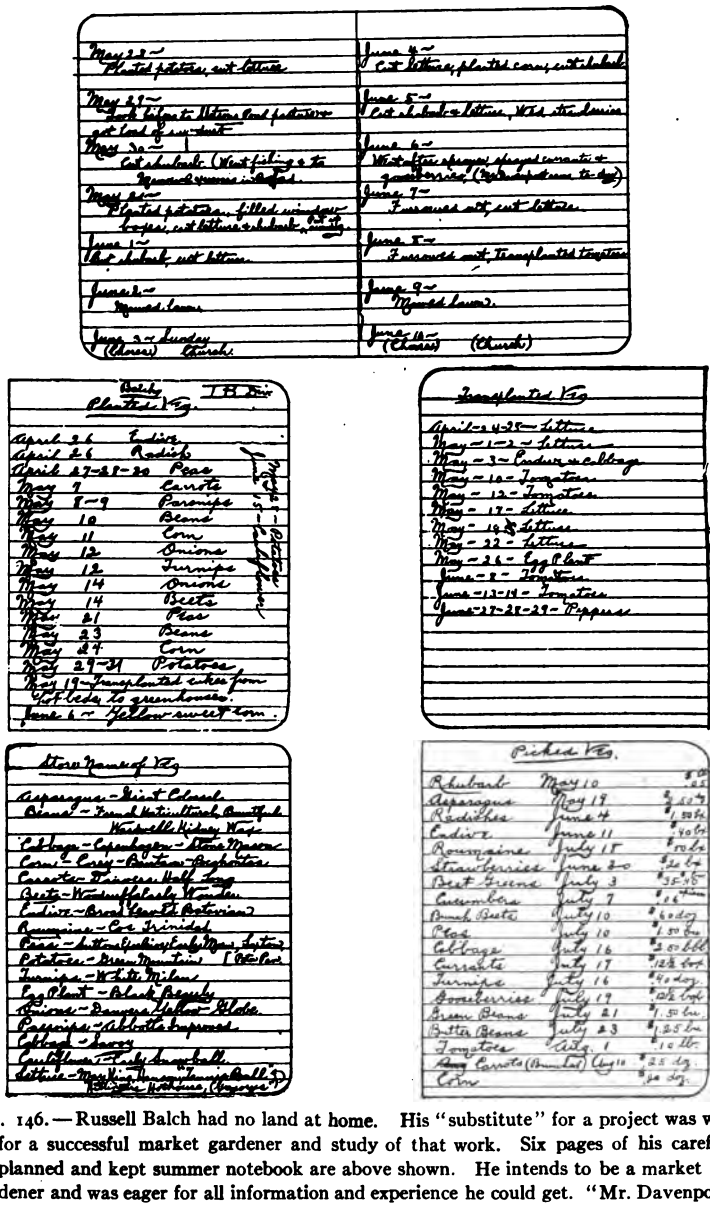


FIG. 146.—Russell Balch had no land at home. His "substitute" for a project was work for a successful market gardener and study of that work. Six pages of his carefully planned and kept summer notebook are above shown. He intends to be a market gardener and was eager for all information and experience he could get. "Mr. Davenport," who called June 6, was one of his instructors. Essex County Agricultural School.

type of school, which is to prepare boys for farming, all subjects, particularly the science subjects just mentioned, are taught so as to show their relationship to the productive work the boys are carrying on and their bearing upon the careers the boys intend to follow. Stated in percentage, the separate or county school reserves about 50 per cent of the time of the boys for project study and project work, about 30 per cent for subjects whose relationships to agriculture are strongly

FIG. 147. — Be the cash crop projects what they may, there is constant exploration of books and bulletins, for sound and usable information directly bearing upon the projects in hand. Essex County Agricultural School.

emphasized and clearly brought out, and about 20 per cent for non-agricultural subjects, such as good reading, writing, and speaking, duties of citizenship, and wholesome recreation.

Pains are taken in the separate and county schools to keep the training of the agricultural pupils in desirable educational balance. This is shown by the diagram on page 264. With due encouragement from their agricultural instructors to devote half the school day to well-chosen high school studies, a desirable balance, as shown by the diagram on page 265, is readily achieved in the education of pupils enrolled in agricultural departments of high schools.

The courses in schools and departments generally cover four years, each year a unit complete in itself. Various adaptations to the needs of all-day pupils who wish to specialize instead of taking all of the major projects, also to the needs of "part-time" pupils in day classes and to those of adults in "evening classes," are listed below. Assignment of projects to odd and even years, in

FIG. 148. — Also, there is continuous "related study" in laboratory exercises. Test for comparative rapidity with which water percolates through different types of soil. Water is of paramount importance in market gardening. Concord Agricultural Department.

the case of the high school department, is for the purpose of enabling the one-teacher department to divide its agricultural pupils in the four years' course into two groups of about ten each. This plan enables the teacher to devote a full half of the school day to each group, and to cover the entire course without himself teaching projects in more than two fields in any one year.

**(1) County school**

**A. Agricultural.** — The four years of agricultural training of the school

**(2) High school department**

**A. Agricultural.** — For a department, the four years of agricultural

have been shown in diagrammatic form in Figs. 60, 99, 127, and 183. Instruction in the work of each year is, as a rule, given every year.

The plan of alternation followed in the department with one agricultural teacher may be adopted temporarily by a school, if its enrollment is small, as may happen when a school is first opened.

It will be noted that the instruction from the first year to the fourth is graded up on the scale of the economic risks involved in the projects. Projects which involve the smallest risks are taught in the first year; those which involve the heaviest, in the last year; and those involving intermediate risks are assigned to the second and third years.

With a staff of specialists it is possible to adapt courses to the needs of pupils who desire to specialize. Generally pupils cover most of the four years' course; but a plan of major and minor projects is permissible, by which the greater part of the time of the pupil may be devoted in any given year to the projects which will be most helpful to him in the branch of farming chosen for his career. For example, dairying may be omitted altogether in the last two years, market gardening may be the major project occupying three-fifths of the time set apart for project instruction, and fruit growing may occupy the remainder of the project time. Or market gardening may be omitted, dairying may occupy three-fifths of the time set apart for the study of projects, and the remainder of the project time may be devoted to fruit growing, continuation training outlined for a school require adaptation such as that suggested in Figs. 47 and 48 above. Each pupil may devote one-half his school time to agriculture. Pupils in a four years' course in a department can be taught by one agricultural instructor only by a plan which enables them to be taught in two separate groups.

Accordingly, courses are offered in alternate years so that at no time is an instructor carrying more than the work of two different years. In Figs. 47 and 48 the diagrams show the assignment of courses by odd and even years, and presuppose the grouping of the younger pupils of the first and second years in one class, and the older pupils of the third and fourth years in another class.

Less latitude in offering instruction in major and minor projects is found in a department than is practicable for a school. A certain amount of specialization is, nevertheless, possible where the farming of a locality is itself highly specialized, as, for example, by omitting dairying in favor of market gardening, or *vice versa*.

FIG. 149. — Certain schools may specialize. Essex County Agricultural School is well located to specialize in fruit growing. Orchards near are inspiration, especially 150 acres on Turner Hill Farm. Apple harvest on this farm.

ance of a poultry project begun in a previous year, continuance of a previously studied swine-raising project, or continuance of a bee project. The foregoing do not exhaust, but merely illustrate, the variations by which a four years' course may be adapted to the career needs of individual pupils.

Following, for the sake of clearness, will be found a more detailed statement, by years, of the distinctively agricultural instruction:

**(A) For first-year pupils. All years.** — Eighty per cent of the pupil's time.

Agricultural science and projects applied to a given community.

**a. Plant projects (elementary).**

**(a) Kitchen-gardening projects (major).** — Vegetable and small fruit growing.

**(A) For first and second year pupils. In even years.** — Fifty per cent of the pupil's time.

Agricultural science and projects applied to a given community.

**a. Plant projects (elementary)** (School years ending 1916, 1918, etc.).

**(a) Kitchen-gardening projects (major).** — Vegetable and small fruit growing.

FIG. 150. — Director F. A. Smith of Essex County Agricultural School developed these plantations. Low-down, handy orchard wagon. Note crossed reaches. Rear axle on circle, like front, swings away from tree when short turn is made. Picking basket lined with burlap. Turner Hill Farm.

(b) **Ornamental-planting projects (minor).** — Caring for shrubbery, flowering plants, and lawns.

Home projects are the central concern of the school as of the department, in connection with the two kinds of projects above mentioned.

Pupils with no home land, or a small amount, may be provided land for individual projects at the school.

Projects of the school itself illustrate good methods for both adult farmers and pupils. The distance from the classroom to the illustrative project may be shorter in a school than in a department. School projects, moreover, afford convenient opportunities for group instruction

(b) **Ornamental-planting projects (minor).** — Caring for shrubbery, flowering plants, and lawns.

Properly conducted, the projects are forced into commercial conditions. Realities are dealt with. Home projects predominate. No boys and no instructors are used on school projects and no capital is tied up in them.

Most communities have good examples, for purposes of observation, of plant projects of the various kinds dealt with in the projects of the pupils. Most communities furnish some opportunity for group instruction in preparation for projects of the two kinds above mentioned. Any home with land about it will be the better

FIG. 151. — Director Smith's boys have developed a nursery at the Essex County Agricultural School, but have access also to this on Turner Hill Farm. Two years old ready for planting. Note cover crop, barley and oats, sown three bushels per acre on Aug. 25th. 12,000 pounds to acre of green vegetable matter grown in a season. Berry plantations similarly cover-cropped.

of pupils in both observation and practice work. Their nearness to the classroom is a strong advantage in time-saving. It is confessedly difficult to give school projects the push and reality of the enterprise of the farmer who is depending upon his production for his living. While the school, therefore, may gain in convenience of access to projects for observation and practice work, it may lose something of the vitalizing contact with the farmer's enterprise which the department affords its pupils. Where school projects are made to approximate most nearly the commercial type, they afford facilities for drilling pupils unused to farm work in oft-repeated operations, until the requisite skill and speed have been attained.

for a good garden and a good lawn. Where the home land is not sufficient for the full employment of a pupil on home projects, he finds other land near, or finds employment on approved farms in his vicinity. The project and other farm earnings of pupils in departments compare favorably with those of pupils in schools.

More time may sometimes be required to go from a department to an illustrative project, or to a farm for group instruction, than is required to pass from schoolroom to field at a school. This is largely offset, however, by the nearness of the department to the homes of the pupils. The greater amount of time occasionally required in getting from a department to a farm may be more than offset by the lesser time required for

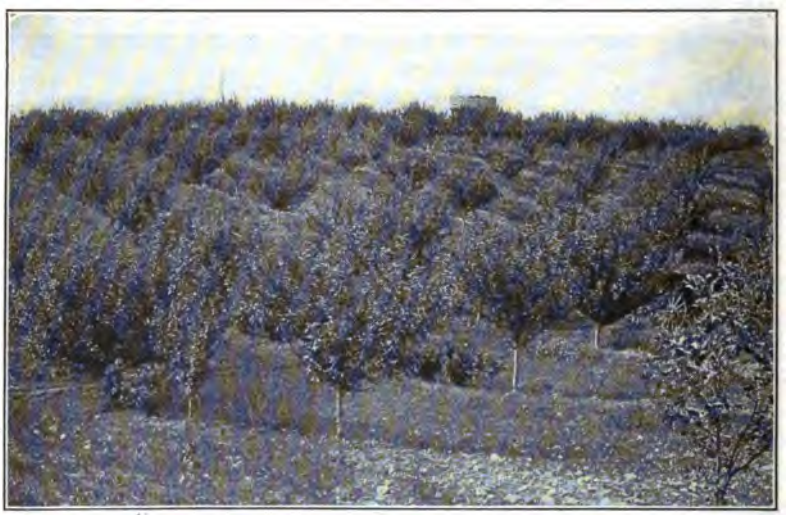


FIG. 152. — Other cover crops valued by Director Smith are cow-horn turnips and dwarf Essex rape. One of young orchards on Turner Hill Farm. Note good "air drainage."

Trial projects may be carried out by a school, thus affording pupils a convenient opportunity to work with plants or animals not commonly produced in the vicinity, and to travel day by day on the road to and from school. There have been notable instances of practice work on farms where pupils have been inspired by their surroundings, where

FIG. 153. — Dwarf Wagener six years old. Fruit thinned, but shows need of further thinning. For size of fruit, compare Director Smith's watch in tree. For low heading, compare height of head as measured by hat. Dwarf trees used as "fillers," until permanent trees require the ground.

observe their adaptability to local conditions. A school with illustrative and trial projects in progress need not ask anybody's permission, but may enter any part of its own premises with its classes at will.

All of the foregoing give a school advantage over a department in econ-

their skill has been enhanced and their operative speed much increased.

The independent project of the pupil, with frequent supervision by the instructor, generally more than offsets any limitation of opportunity for group instruction due to the lack of land at a high school.

omizing time and travel of both instructors and pupils during school hours.

The school grounds may be more or less extensive. They need to be kept in order. A school with a large enrollment may employ a specialist in landscape gardening. In such a case, the school premises offer excellent opportunity for specialization to the pupil who has chosen landscape gardening for his career.

Boys who require land at a school for projects are the exception. In the few such cases that occur, the individual projects of the pupils are limited sizes, degrees of skill and dependability, is found on their home farms or on farms near by.

Home projects rarely occupy more than half the working time of the pupils. Generally, supplementary farm practice for which they are paid cash or allowed credit in lieu of cash, at the rates prevailing in their localities for boys of their ages, varying

FIG. 154. — Ontario, eight years old, bearing 4½ bushels. Note Director Smith's low-headed standard apple-trees. Woman picker straightened up one day and told him she objected to stooping over to pick apples.

The instructors lead their pupils from time to time in their work, thus teaching them the handiest ways of doing things, and setting them a proper pace. They do not merely inspect and mark.

so as not to require more than half of the working time of the pupil during the producing season. Their work on their projects is supplemented by work for pay on the illustrative or trial projects of the school. The rate of pay is determined by the skill of the pupil, the rate being advanced as his skill improves.

The instructors participate in the work of the school projects in connection with which their pupils are taught. They show the boys how to do things in the best way and set the pace. They are leaders, not merely overseers.

(c) **Subprojects in farm-shop work.** — Making and repairing, for home and school use, hotbeds, coldframes, etc.

The paraphernalia of the school farm offers an exceptional range, in the form of repairs and additions to buildings and equipment, for group instruction in farm-shop work.

A school with a large enrollment may employ a special farm-shop instructor. The school should have a marked advantage over the department in the execution of projects in farm-shop work on easily portable farm equipment.

b. **Related study.** — The tendency of the project instructors in a school is to deal with the most practical aspects of the training of their

(c) **Subprojects in farm-shop work.** — Making and repairing, for home and school use, hotbeds, coldframes, etc.

In some departments most of the projects in farm-shop work are carried out in the winter during the special agricultural instructor's vacation, and are taught by the manual training teacher, or by a foreman carpenter who has a slack season in winter. In such cases the projects are planned by the pupils and approved in advance by the agricultural instructor.

In other cases the agricultural instructors themselves teach their boys all necessary projects in farm-shop work.

The success of this part of the training of the pupils depends, in no small degree, upon the mechanical skill and ingenuity of the agricultural instructor.

b. **Related study.** — Planning the above projects involves a study of the biology of plants, including considerable agricultural botany; soils and

pupils, in the planning of projects, in the group instruction necessary for giving the pupils skill and speed in the various manipulative processes, and in the supervision of their pupils in the carrying out of the projects. their amendments, and plant foods; injurious insects and their control; implements and their uses.

The project instructors deal with the various sciences only so far as they have something which may be

FIG. 155. — Point-blank shot at young Rhode Island Greening. Note spray on foliage and faultless fruit. Director Smith believes that selected stock pays in trees no less than in live-stock. He buds imported seedlings with buds from young bearing trees of the finest type.

made to contribute to the understanding or efficiency of the projects. To the extent that they go beyond such instruction, their teaching generally has to do with a historical and descriptive background by which the pupil may see his practical operations in relation to the practical operations of others. "Agricultural survey" is the name given this back-

In a department it is generally necessary for the agricultural instructor himself to search out and teach most of the correlations of the various sciences with agriculture required for an understanding by his

ground instruction in chapter III, and its relation to the greater part of the project instructor's teaching is shown on pages 73, 74, and 75, in Figs. 57, 58, and 59. The diagrams referred to are equally applicable to department and county school schedules.

Planning the above projects, however, involves a study of the biology of plants, including considerable agricultural botany; soils and their amendments, and plant foods and feeding; injurious insects and their control; implements and their uses.

As a rule, the project instructors pupils of their projects. He gives no attention to the teaching of any science as such. All of his teaching of botany, chemistry, physics, biology, mathematics, and accounting is confined to their applications to the projects of his pupils and the requisite skill and speed of his pupils in working out those applications.

That is to say, the project instructor tends to divide his teaching into two more or less unequal parts. Generally, the larger part is devoted to the training of his pupils in the more practical aspects of their proj-

FIG. 156. — Dwarf McIntosh, seven years old. Third time fruiting. McIntosh widely planted in New England. Note size of fruit compared with watch in center. Director Smith used buds from this in nursery propagation at Turner Hill Farm.

control one-half of the time of the pupils. Other teachers are in frequent conference with the project teachers, with a view to devising ways and means by which the closest correlation may be brought about between their instruction and the practical activities of the pupils. The full 30 per cent of the time allotted to the teachers of science and of other related subjects — such as farm arithmetic and accounts, farm drawing and shop work, farm journal reading, biology of plants, botany and entomology — is agricultural.

Laboratory space and apparatus are chosen or arranged primarily because of their adaptability to teaching the correlations of science and other subjects with agriculture.

The project instructors, because of this division of labor, are freer in a ects, and in giving them a historical background for understanding them. The other is devoted to excursions by his pupils into selected sciences and other fields of knowledge for relatable facts and principles.

Team work between the special agricultural instructor and the teacher or teachers of science and other subjects in the high school cannot be counted upon. There have been encouraging instances of it; and there is to-day a tendency in all teaching toward correlating instruction with the environment of the pupil, which in the case of a rural high school with an agricultural department ought to make team work easy. Few distinctively agricultural pieces of apparatus are to be found in the science laboratories of high schools. A fair statement, therefore, of the pre-

FIG. 157. — First prize box of McIntosh, grown and exhibited at Massachusetts Fruit Show by Mr. F. A. Smith, then in charge of Turner Hill Farm, now Director of Essex County Agricultural School. Men who themselves have done and can do what they are expected to teach, are demanded in vocational agricultural education in Massachusetts.

school than in a department to restrict their teaching to the economic and skill-producing features of the projects.

vailing conditions hardly warrants describing the training of agricultural pupils in high schools as being more than 50 per cent agricultural.

**All projects are carefully cost-accounted**

**Written records are kept of all**

**(B) For second-year pupils. All years.** — Eighty per cent of the pupil's time.

Agricultural science and projects applied to a given community.

**(B) For second and first year pupils, in odd years.** — Fifty per cent of the pupil's time.

Agricultural science and projects applied to a given community.

FIG. 158. — Snow of Marblehead, 18, had no fruit trees at home. Hired this orchard for third-and fourth-year project. Pruned, sprayed, and cultivated. Owner pleased. Boy satisfied. Essex County Agricultural School.

**a. Animal projects (elementary).**

**(a) Small animal projects.** — Poultry, sheep, swine, bees, — types, breeding, management, rations, etc.

Generally, opportunity is given for

**a. Animal projects (elementary)** (School years ending 1915, 1917, etc.).

**(a) Small animal projects.** — Poultry, sheep, swine, bees, — types, breeding, management, rations, etc.

carrying major and minor projects, — for example, a major in poultry and a minor in swine or bee keeping. Illustrative school projects are convenient for practice work in group instruction. They are subject to the limitations of school projects, as compared with the economic projects on the better farms. There may be a tendency to depend upon them to the exclusion of the study of methods and practice work under strictly economic conditions. School projects make the instructors independent of neighboring farmers. The danger is that they may become too independent, — that the problems studied by the pupils will be problems of the school, rather than economic problems of the profitable farm.

(b) **Subprojects in farm-shop work** are required for repairing, altering, or constructing the necessary buildings and equipment for the above small animal projects. The study includes plans, kinds and cost of materials, etc.

(c) **Subprojects are also required in home-grown crops for the small animals.** — Some of these crops may be raised for sale as an offset to feeds and some opportunity for group instruction.

Generally, opportunity is given for carrying major and minor projects, — for example, a major in poultry and a minor in swine or bee keeping.

All instruction is subject to the realities of home and commercial conditions.

The community generally furnishes a large range of illustrative projects

FIG. 159. — Mounts showing good and bad cuts in pruning. Close, smooth cuts at extreme right have healed. Other cuts have not healed. Note decay. Such mounts are permanently useful for classroom instruction. Concord Agricultural Department.

(b) **Subprojects in farm-shop work** are required for repairing, altering, or constructing the necessary buildings and equipment. The study includes plans, kinds and cost of materials, etc.

(c) **Subprojects are also required in home-grown crops for the small animals.** — Some of these crops may be raised for sale as an offset to feeds and supplies bought. Kitchen-gar-

and supplies bought. Kitchen-gardening projects previously studied may be continued in lieu of special cash crops. Other crops may be grown for feeding.

(d) **Substitutes for home projects.** — The pupils without facilities at home may be provided opportunity for individual projects at the school, and may devote part time to work for

dening projects previously studied may be continued in lieu of special cash crops. Other crops may be grown for feeding.

(d) **Substitutes for home projects** with small animals may be offered by boys who have no opportunity for such projects at home, and may consist of employment on approved farms where the small animals studied are kept.

FIG. 160. — Varieties of apples identified, and compared for quality. Cut lengthwise and across through the core. Drawings of cross-sections made. Boy standing, son of one of largest market gardeners in Eastern Massachusetts. Has both garden and fruit projects at home. Only most desirable varieties should be grown. Concord Agricultural Department.

pay on illustrative and trial projects with small animals, and subprojects connected therewith, conducted by the school itself.

As in the case of plant projects, small animal projects seldom occupy the entire working time of the pupil. Most of the pupils find supplementary farm work at home, on farms near by, or at the school.

The neighborhood generally affords excellent illustrative projects for purposes of observation and some opportunity for group instruction. It is seldom that a pupil has no conveniences at home for at least projects of the first and second years.

Small animal projects seldom occupy the entire working time of the pupil. Most of the pupils find supplementary work at home or on farms near.

**All projects are carefully cost-accounted**

**Written records are kept of all**

**b. Related study.** — The tendency to division of labor between other teachers and project instructors, noted in connection with the teaching of plant-project pupils, is equally pronounced in connection with the teaching of pupils with small animal projects.

Planning any of the above projects involves a study of the biology of animals, including problems of hygiene, sanitation, breeds and breeding, feeds and feeding, buildings and equipment, — kinds, cost, plans, etc. The subprojects in cropping involve a study of

**b. Related study.** — Planning any of the above projects involves a study of the biology of animals, including problems of hygiene, sanitation, breeds and breeding, feeds and feeding, buildings and equipment, — kinds,

FIG. 161. — Fruit propagation. Root stocks grafted with Baldwin and McIntosh scions. Set in nursery rows. Transplanted, year to year. "Related Study" botany unit on "cambium layer." Smith School, Northampton.

cost, plans, etc. The subprojects in cropping involve a study of kinds, quantities, seeds, soils, place in farm-crop rotation, fertilizing, tillage, harvesting, and storage.

As in the case of gardening and ornamental planting, the project instructors deal with the various sciences related to the keeping of

kinds, quantities, seeds, soils, place in farm-crop rotation, fertilizing, tillage, harvesting, and storage.

There are important contributions to be had from the sciences of chemistry and physics to the understanding of small animal projects. This applies particularly to the working out of the problems of feeding and of artificial incubating and brooding. Sometimes a veterinarian is employed for special instruction in prevention or treatment of small animal diseases. In the absence of such a specialist, the project instructor himself undertakes to train his boys in such elements of veterinary science as will prepare small animals only so far as they have something which may be made to contribute to the understanding of the projects or their efficient execution.

Moreover, just as in the teaching of plant-project pupils in even years, so in odd years the agricultural instructor will generally find it necessary to search out for himself and to teach most of the correlations of biology, chemistry, physics, and veterinary science required by his pupils for the proper understanding and successful execution of their small animal projects and their subprojects in crop growing. He will, also, generally find it necessary to

FIG. 162. — Propagation by top-working. Jack Kershlis (left) and Ralph Hibbard grafting a young apple tree of unknown variety with scions of variety known to be good. Jack first at public prize speaking, first prize winner in stock judging, and crack baseball pitcher of school nine. Such Polish boys an honor to old Connecticut Valley. Hadley Agricultural Department.

them for the prevention of disease or its prompt detection, quarantine, or cure. Appropriate farm journals, bulletins, and books are read or studied.

As in the first year, the project instructor ought to be more free in a school than in a department to restrict his teaching to the economic and skill-producing features of the projects of his pupils.

FIG. 163. — "School project." Renovation of land. Buckwheat kills weeds and furnishes mass to plow under for humus. Taught as particularly valuable in preparing rough land for orcharding. Essex County Agricultural School.

teach the drawing, estimating of costs, etc., required by the subprojects in farm-shop work.

Of course, here, as elsewhere, the agricultural instructor will do his utmost to make the teachers of chemistry, physics, biology, English, and mathematics in the high school acquainted with the problems involved in the projects of his pupils, and to assist them in efforts to correlate their instruction with the practical activities of the agricultural pupils. Success of such efforts in connection with small animal projects will probably continue to be as variable as success in efforts to bring about correlation between teaching of other high school subjects and plant projects.

(C) **For third-year pupils. All years.** — Eighty per cent of the pupil's time.

It is not safe to assume at present that much over 50 per cent of the teaching of the agricultural pupils in high school departments can be regarded as distinctively agricultural.

(C) **For third and fourth year pupils. In even years.** — Fifty per cent of the pupil's time.

FIG. 164. — Clarence Almquist at school. "Related Study" of school project. Cash crop has been followed by cover crop of rape and crimson clover, "to keep land busy." Will be plowed under in spring for "green manure." Boy has several projects at home. Petersham Agricultural Department.

Agricultural science and projects applied to a given community.

**a. Plant projects (advanced).**

Agricultural science and projects applied to a given community.

**a. Animal projects (advanced)** (School years ending 1916, 1918, etc.)

(a) **Fruit-growing projects.** — Orcharding and small fruit growing not before dealt with, soils, fertilizers, cover crops, sprays, propagating, cultivating, picking, grading, packing, storing, marketing, etc.

(b) **Market-gardening projects.** — Soils, seeds, fertilizers, tillage, harvesting, storing, marketing, etc.

The major projects may be fruit growing, and the minor, market gardening, or *vice versa*.

For the village and city boy, the illustrative and trial projects of a school are a marked advantage in connection with such long-time projects as orcharding and such big-scale projects as market gardening.

What has been said previously about convenience of access and independent control by the school of projects on the school premises for observation and practice work applies equally here. Many boys may be able to make adequate provision at home for first and second year projects. A lesser number will be able to make provision at home for projects of the third and fourth years. Herein is an important justification of the possession of a farm and its operation by a school.

The combination of market gardening, or the growing of cash crops, with fruit growing is desirable. Fruit growing generally is a long-time development project. This is true if a boy begins with young trees. It is true, also, if a boy begins with old trees that seriously need renovation. Of course, market gardeners hold that land not previously used for market gardening requires about five years

(a) **Larger animal projects.** — Including dairying and general farm management.

Generally, the major project is dairying. Minor projects, consisting of the continuance of projects begun in previous years, may be carried.

Dairying, however, may be omitted in communities where there is little dairying in favor of specialization in fruit-growing and market-gardening projects, such as those described for third-year pupils in county schools and those hereafter described for third and fourth year department pupils in odd years.

(b) **Subprojects, cropping, and farm-shop work.** — When dairying is chosen, subprojects in dairying are carried, such as the growing of crops for the larger animals, including such heavy crops as silage corn, clover, and alfalfa for the cattle, and oats for the horses. Other subprojects are carried in farm-shop work and construction, dealing with buildings and appliances. There are, also, subprojects in the breeding, care, and management of working animals, including horses.

to put it in prime condition for the most profitable vegetable growing. Nevertheless, a quick turnover with a fair profit the first year may generally be expected. Thus from his cash crop or crops the boy derives income during the season or seasons in which he is launching his fruit-growing enterprise.

(c) **Subprojects in farm-shop work** and other construction are required in connection with keeping tillage tools in order; making and repairing hotbeds, cold-frames, and flats, also containers for harvesting, storing, and marketing fruit or vegetable products; and overhauling power sprayers.

(d) **Substitutes for home projects** in fruit growing or market gardening are sometimes accepted, as when a boy finds employment on a fruit or market-garden farm with the privilege of attending the school part time and putting into practice at the place of his employment the leading methods taught by the school.

Boys who offer substitutes are visited regularly by their agricultural instructors.

Here, as in other years, the instructors lead and set the pace for their pupils from time to time in teaching them the speed and skill requisite for their competent training.

As in other years, projects or substitutes for projects rarely occupy all of the working time of the pupils. As the pupils mature and their parents and others gain confidence in their instructors, the scale of their projects tends to increase and to occupy a larger and larger part of their time. They generally, however, find time

(c) **Substitutes for home projects** are accepted, such as employment on a dairy farm with the privilege of attending dairy classes, and with responsibility for cost-accounting and record-keeping in connection with one or more cows and one or more crops.

Pupils offering substitutes for projects are visited regularly by their instructors, and no pains are spared to give their practical work the utmost educational value.

Here, as in other years, the instructors lead and set the pace for their pupils from time to time in teaching them the speed and skill requisite for their competent training.

Dairy farmers have been found very willing to employ boys part time and have them supervised, in consideration of the valuable records

for other farm work, for which they are paid, or for which they receive credit in lieu of cash, at home or on farms near by.

of production thus put in their hands at the end of a year.

Dairy projects and substitutes for projects rarely occupy the entire

FIG. 165. — Orchard pruned and sprayed by pupils. Field next to orchard cover cropped with turnips and crimson clover. Boys and instructor looking for nodules on clover roots. Ten acres of tillable land here. But land at school is not required for state aid in Massachusetts. Petersham Agricultural Department.

Where a pupil has his project at a school he generally finds employment on the illustrative and trial projects in fruit growing and market gardening at the school itself, for which he is paid wages in proportion to his ability.

Home projects and other home farm work are preferred and predominate.

working time of the pupils. Most of the pupils do additional farm work for pay, or for credit in lieu of cash, at home or on farms near by.

**All projects are carefully cost-accounted**

**Written records are kept of all**

**b. Related study.** — Planning the foregoing projects and subprojects involves a study of agricultural chemistry, with special reference to fertilizers and sprays; of agricultural physics, with special reference to pumps, air compressors, caring for hose, and keeping the various tools and implements in order; of economic entomology; of farm journals; and of markets and accounting.

The further remarks regarding related study above, in discussing first and second year projects, apply here.

**b. Related study.** — Planning the above projects and subprojects involves a study of the biology of animals, including breeds and breeding, feeds and feeding; of prevention and cure of animal diseases; of hygiene and sanitation, especially in connection with the planning of buildings and their equipment; of soils and seeds; green manuring, liming, uses of barnyard manures and commercial fertilizers; of crop rotations; of balancing of rations; of tillage and tillage tools; of harvesting and har-

FIG. 166. — "Coming through the rye and vetch." Cover crop for soil improvement. Bristol County Agricultural School.

**(D) For fourth-year pupils. All years.** — Eighty per cent of the pupil's time.

Agricultural science and projects applied to a given community.

**a. Animal projects (advanced).**

**(a) Larger animal projects.** — Including dairying and general farm management.

Generally the major project of the fourth year is dairying.

Pupils who do not intend to follow dairying may, however, omit dairying in favor of specialization on one or more other phases of productive agriculture. For example, in the cases of those who desire to specialize in fruit growing or market gardening, projects begun in the third year may be continued through the fourth, and their study correspondingly amplified.

Pupils who desire to specialize in dairying may begin dairy record-keeping as an incidental activity, even in the first year, and continue it throughout the four years' course, with more or less attention from the special instructor in dairying. As a rule, a well-balanced course, including projects of the third year, is desirable; vesting devices; of silos and other storage for roughage; and of implements and machines, their cost, use, and upkeep.

The project instructors deal with the various sciences only so far as they have something which may be made to contribute to the understanding and efficiency of the projects.

The further remarks regarding related study above, in discussing first and second year projects, apply here.

**(D) For fourth and third year pupils. In odd years.** — Fifty per cent of the pupil's time.

Agricultural science and projects applied to a given community.

**a. Plant projects (advanced).** (School years ending 1915, 1917, etc.)

**(a) Fruit-growing projects.** — Orcharding and small fruit growing not before dealt with, soils, fertilizers, cover crops, sprays, propagating, cultivating, picking, packing, storing, marketing, etc.

and the serious attack upon the problems of dairy farming as such is reserved for the fourth year.

Where there is no specialization in fruit growing or market gardening, minor projects in one or both of these fields may be carried during the fourth year, in addition to major projects in dairying.

(b) **Subprojects, cropping, and farm-shop work.** — When dairying is chosen, subprojects in dairying are carried, such as the growing of crops for the larger animals, including such heavy crops as silage corn, clover, and alfalfa for the cattle, and oats for the

(b) **Market-gardening projects.**— Soils, seeds, fertilizers, tillage, harvesting, storing, marketing, etc.

The major projects may be fruit growing, and the minor, market gardening or *vice versa*.

In a section largely devoted to

FIG. 167. — Another type of soil improver, in from the range to produce her litter. After dinner naps. Day-old pig as well as day-old chick receives attention. Bristol County Agricultural School.

FIG. 168. — Slopes with windbreak. School farmhouse at left. Method of laying out and staking for young orchard. Boys set out 500 apple trees on permanent, semi-permanent, and filler plan, using Baldwin, Wealthy, Wagener, McIntosh. Smith School, Northampton.

horses. Other subprojects are carried in farm-shop work and construction, dealing with buildings and appliances. There are, also, subprojects in the breeding, care, and management of working animals, including horses.

(c) **Substitutes for home projects** may be accepted, such as employment on a dairy farm with the privilege of attending dairy classes, and dairying, market gardening may be omitted in favor of enabling pupils to specialize during the third and fourth years in dairying. But even where the major projects are dairying, it is in the interest of well-balanced farming that the pupils carry at least minor projects during the third and fourth years in fruit growing, including orcharding.

(c) **Subprojects in farm-shop work and other construction** are, of course, required here as elsewhere. Tools must be kept in good working order

FIG. 169. — Setting out small peach orchard. "Related Study" group exercise another year. Not all related study is study of books and bulletins or exercises in laboratories. This is an orcharding "practicum." Smith School, Northampton.

with responsibility for cost-accounting and record-keeping in connection with one or more cows and one or more crops.

Efficiency is held to hinge on avoidance of congested numbers. Even if a farm on which a pupil finds a substitute for a home project does not and their use must be mastered. Hotbeds, cold-frames, and flats must be made. Containers for harvesting, storing, and marketing fruit and vegetable products must be provided and kept in repair. Most of the instructors have automobiles, and are prepared to teach at least the simpler

follow the best methods nor attain the highest standards, it will be surcharged with the realities of an enterprise struggling forward on its own feet. Supplemented by observation of, and occasional participation in, work of the best farms visited, including that of the county school, even such a farm will give a boy first-hand knowledge of, and fundamental drill in, the season to season operations of the yearly farm routine.

The practical work on substitutes is followed up by the agricultural instructor as closely as is that of pupils who have projects on their home farms.

Here, as in other years, the instructors lead and set the pace for their pupils from time to time in teaching day-to-day repairs and adjustments required by power sprayers and other motor-driven apparatus.

**(d) Substitutes for home projects.** — Most departments are in rural high schools, or in high schools of cities with farming in their suburbs. The departments, therefore, are not perplexed so much as a county school may be by the problem of finding land and equipment for home projects. Nevertheless, in the last two years it is harder than in the first two to provide for home projects adequately. In the country, in a village, or in a suburb, as a rule, the smaller boys find little difficulty in providing for the smaller home projects of their first two years. But in not a few cases, when the third or fourth year is

FIG. 170. — Home project in orcharding. 345 apple trees set out in 1913 by Gordon Nightingale. Intercropped with corn and pumpkins. Water pumped away from tree roots by turnips sowed along the rows of trees at right time to harden new growth of trees for winter. Baldwins for permanent trees; McIntosh, for semi-permanent; Wealthy, for fillers. Petersham Agricultural Department.

them the speed and skill requisite for their competent training.

Dairying projects and substitutes for projects rarely occupy the entire working time of the pupil. Most of the pupils do additional farm work for pay, or for credit in lieu of cash, either at home, at the school, or on farms near by.

The school has the first claim upon the pupil during his course, and the right to determine what he shall do, also how and when he shall do it, in projects agreed upon. It does not monopolize his time, nor does it undertake to run the entire home farm or other farm on which the pupil may reached, the boys, now bigger, who are genuinely minded to become farmers, live at homes which are without land and equipment for the long-time projects of dairying or fruit growing and the big-scale projects of market gardening or cash crop growing.

FIG. 171. — One of trees, not the largest, second summer, 1914, in Gordon's orchard project. Note well-balanced, low head and symmetrical shape. Intercropped as before. Cover-cropped, of course. Rye sowed at last cultivation. Plowed under in following spring. Gordon at right. His instructor at left. Petersham Agricultural Department.

That is to say, substitutes for home projects may be required in the last two years more often than in the first two.

Consequently, it has been suggested that departments confine their teaching to first and second year projects, and promote their older boys to one or another of the county

FIG. 172. — Boys learn to spray by spraying. Group instruction. Too few participants, too many spectators. School trees, sprayed in school time, with school equipment. Support to individual project work. Smith School, Northampton.

be employed. Indeed the sharper the contrast between the pupil's project and less capable farming in its vicinity, the clearer the lesson and the more potent the school in the community. Repeatedly methods followed by boys on a small scale have the next year been followed by their fathers and others on a big scale.

The " gang-labor " type of work is avoided in the fourth year, as in all others, by seeing to it that most of the work of pupils shall exemplify their teaching, and by requiring the utmost individual initiative and responsibility.

FIG. 173. — " Pounds of Prevention." Tent caterpillar nest collecting contest. Contests in Hadley and Harwich most notable. Million "tents" kept from multiplying. School Committee and others pay for nests brought to school, or award prizes. Hadley Agricultural Department.

schools. Advantage could thus be taken of the illustrative and trial projects at the school for group instruction in observation and practice work, and some opportunity might be had there for individual projects. This policy would have much in its favor in a county school which undertook to restrict its enrollment at the central school to a moderate number, consisting mainly of pupils sixteen years of age or older, and to do its work of the first two years mainly through the one-teacher branches elsewhere referred to. The county school itself, however, must be protected against congestion. The problem of providing adequate project and other productive employment for a big number at a school might be insurmountable, whereas providing acceptable substitutes now and then

for a boy in a department is comparatively easy.

Efficiency is held to hinge on avoidance of congested numbers. Even if a farm on which a pupil finds a substitute for a home project does not follow the best methods nor attain the highest standards, it will be surcharged with the realities of an enterprise struggling forward on its own feet. Supplemented by observation of, and occasional participation in, work of the best farms visited, including that of the nearest county school, even such a farm will give a boy first-hand knowledge of, and fundamental drill in, the season to season operations of the yearly farm routine.

Acceptable substitutes, when required, are commonly found in the vicinity of a department.

The practical work on substitutes is followed up by the agricultural instructors as closely as is that of pupils who have projects on their home farms.

The combination of long-time fruit projects with the annual turnover found in market garden or other cash crops is as desirable here as in a school, and for the reasons stated in discussing third-year school projects.

Here, as in other years, the instructors lead and set the pace for their pupils from time to time in teaching them the speed and skill requisite for their competent training.

As in other years, projects or substitutes for projects rarely occupy all of the working time of the pupils. Projects tend to become larger as the

FIG. 174. — Spraying peach trees to prevent rot. Learning how to operate a power sprayer. Bristol County Agricultural School.

FIG. 175. — Time to cultivate the peach orchard. Boy handling the team. Bristol County Agricultural School.

boys grow up and confidence in them and their instructors increases. Still there is generally about half of the working time available for general farm work for wages, or for credit in lieu of cash, on the home farms or on other farms near.

The department has the first claim upon the pupil during his course, and the right to determine what he shall do, also how and when he shall do it, in agreed-upon projects. It does not monopolize his time, nor does it undertake to run the entire home farm or other farm on which the pupil may be employed. Indeed the sharper the contrast between the pupil's project and less capable farming in its vicinity, the clearer the lesson and the more potent the department in the community. Repeatedly methods followed by boys on a small scale have the next year been followed by their fathers and others on a big scale.

The "gang-labor" type of work is avoided in the third and fourth years, as in all others, by seeing to it that a fair proportion of the work of pupils shall exemplify their teaching, and by requiring the utmost individual initiative and responsibility.

**Home projects, supplemented by other home-farm work, are preferred and predominate**

**All projects are carefully cost-accounted**

**Written records are kept of all**

**b. Related study.** — Planning the above projects and subprojects involves a study of the biology of animals, including breeds and breeding, feeds and feeding; of prevention and

**b. Related study.** — Planning the foregoing projects and subprojects involves study of chemistry, with special reference to fertilizers and sprays; physics in its applications

cure of animal diseases; of hygiene and sanitation, especially in connection with the planning of buildings and their equipment; of soils and seeds; of green manuring, liming, uses of barn-yard manures and commercial fertilizers; of crop rotations; of balancing of rations; of tillage and tillage tools; of harvesting and harvesting devices; of silos and other storage for roughage; and of implements and machines, their cost, use, and upkeep. The foregoing study is particularly rich in contributions from chemistry, physics, and veterinary science. Attention to pumps, air compressors, implements, and motors; farm journals; plant physiology, including plant diseases; economic entomology; markets; accounting; and business methods in correspondence and filing papers. Particular attention is given to the principles and the best methods of farm management.

FIG. 176. — School project. Boston boxes are convenient for carrying fruit. Note training in careful habits of picking and handling apples. Essex County School.

The project instructors deal with the various sciences only so far as they have something which may be made to contribute to the understanding and efficiency of the projects.

tention is also given to methods of competitive and coöperative buying and selling, to accounting, and to other business methods, including typewriting correspondence and filing papers.

Particular attention is given to the principles and the best methods of farm management.

What has been said further regarding related study in previous years is equally applicable here.

**(E) Part-time pupils. Any year.** — The foregoing four years' plan consists of a series of courses each complete in itself. It is progressive for the pupil who can take the entire series. But it has certain age and economic risk adaptations which make it advantageous for a pupil,

What has been said further regarding related study in previous years is equally applicable here.

**(E) Part-time pupils. Any year.** — The foregoing four years' plan, consisting of a series of courses each complete in itself, and occupying only one-half the school day, has strong attractions for older boys who may have graduated from a regular high school course, who are engaged

FIG. 177. — Training in box packing. School project. Box packing not too good for the best. Apple packing table made by the boys. Essex County Agricultural School.

particularly one who has graduated from a high school, to take part of it, and to restrict school attendance to distinctively agricultural classes.

Every year pupils are admitted for agreed-upon parts of the four years' course. In each such part-time case, however, project study and project work, like those required of all-day pupils, are required, and carry with them the duties and privileges of home-project supervision, or supervision of acceptable substitutes for home projects. The project study includes cost-accounting, record keeping, and reporting.

in farm work, and who could devote one-half the school day to project study and project work.

The proportion of part-time pupils is greater in departments than in county schools, due, perhaps, to convenience of access. Rarely does a pupil have to travel more than five miles to reach a department; the average distance is much shorter than that.

FIG. 178. — Myron Gale picking apples at home. Year of photo. he earned $154.50 cash from farm work, and got $67.22 from his home projects. Hadley Department.

The requirements for the part-time pupils while in the course are identical with those of all-day pupils as to project study and project work, including cost-accounting, record keeping, and reporting. Home projects or acceptable substitutes therefor are required and are supervised.

**All home projects are cost-accounted**

**Written records are kept of all**

**(F) Evening class. Any year.** — Almost any of the short units in the series of courses for all-day pupils can be given adults in evening classes. Demand for such instruction is being met.

Home projects, or acceptable substitutes, are required of evening class pupils, and carry with them the duties and privileges of supervision. That is to say, no school wastes time on academic agriculture. Each school, in its work with adults, no less than in its work with boys, aims its instruction at better farming, and will not spend county or state money on any man who will not put into effect at the first seasonable opportunity certain well-proved principles of better farming, and permit the school to observe

**(F) Evening class. Any year.** — Short units of instruction are readily selected from the foregoing four years' series which can be taught adults in evening classes.

Demand for such instruction is being met.

An interesting phase of evening class instruction is the class for graduates of the regular course who desire to study more thoroughly, and in the light of their farm work, certain of the units previously dealt with to some extent in their project study and project work.

In connection with all evening class study, home projects, or acceptable substitutes, are required, either concurrently with the study, or at the first seasonable opportunity, and

FIG. 179. — Frank Kokoski and his own apples at home. He pruned and sprayed. He also had onion project for cash crop. Helped on other farm work, including large acreage of tobacco. Hadley Agricultural Department.

| ORCHARDING | Skill at Entrance | CERTIFICATION | | | |
|---|---|---|---|---|---|
| | | Skill | Age | Year | Certified by |
| *1. Grafting, cleft | | | | | |
| *2. Grafting, root | | | | | |
| *3. Budding | | | | | |
| *4. Setting trees | | | | | |
| *5. Pruning young apple trees | | | | | |
| *6. Pruning mature apple trees | | | | | |
| *7. Pruning renovation | | | | | |
| 8. Pruning peach trees | | | | | |
| 9. Pruning pear trees | | | | | |
| 10. Pruning plum trees | | | | | |
| 11. Pruning cherry trees | | | | | |
| *12. Mixing lime-sulphur concentrate | | | | | |
| 13. Mixing self-boiled lime-sulphur | | | | | |
| *14. Tobacco extract Black Leaf-40 | | | | | |
| *15. Arsenate of lead, mixing | | | | | |
| *16. Soluble oils, mixing | | | | | |
| *17. Paris green, mixing | | | | | |
| *18. Spraying, winter | | | | | |
| *19. Spraying, spring | | | | | |
| *20. Spraying, summer | | | | | |
| *21. Spraying, knapsack pump | | | | | |
| *22. Spraying, barrel | | | | | |
| *23. Spraying, power | | | | | |
| *24. Thinning apples | | | | | |
| *25. Picking apples | | | | | |
| 26. Picking pears | | | | | |
| 27. Picking peaches | | | | | |
| 28. Picking plums | | | | | |
| 29. Picking cherries | | | | | |
| *30. Grading fruit | | | | | |
| *31. Packing fancy packages | | | | | |
| *32. Packing bushel box | | | | | |
| *33. Packing barrel | | | | | |

FIG. 180. — Section from a Farm Practice Record Blank, 18" × 20". Under "Skill at Entrance," pupil enters ratings he claims. In next column the instructor enters his own ratings of the pupil after training and testing. The asterisks indicate items in which all orcharding pupils, in the department for which this sheet has been approved, are expected to become skilful. See pages 257, 295, and 425. All schools and departments keep such records.

the workability of these principles as applied to his particular farm or the farm on which he is employed.

carry with them the duties and privileges of supervision.

**Adaptation of the " evening class " to agriculture sometimes requires exercises before sunset; and sometimes consists of itinerant, home to home teaching and supervision, with no classes meeting indoors. The latter type of instruction has been considerably developed in supervision of war gardening of those over sixteen years of age.**

**Evening classes may be held in the regular classrooms of the school or department, or in selected neighborhoods. Evening class plans are submitted to the Board of Education for " preliminary approval " prior to putting them into effect, and in all cases are such as not to impair the day class instruction.**

FIG. 181. — New England is famous for its varied scenery, its clear streams and wooded hills. A glimpse of Ipswich River from an apple orchard on Turner Hill Farm. But Massachusetts slopes are highly favorable to fruit growing, and Massachusetts fruit is famous for color and flavor. Some of the boys on graduation have made a one, two, and, sometimes, even a three or four year start on fine home orchards. Boys begin, — they do not have to wait, under the home project plan of education.

**All home projects are cost-accounted**

**Written records are kept of all**

**B. Non-agricultural. Required of all-day pupils.** — Twenty per cent of the pupil's time.

Parallel with the agricultural project study and project work above

**B. Non-agricultural. Optional, but advised.** — Fifty per cent of the pupil's time.

Pupils giving one-half the high school day to agricultural project

outlined, the all-day pupils in county schools are required to devote one-fifth of their time to the study of such subjects as the following:

(A) **English**, every year, to give a love for good reading in books, papers, and magazines; drill in spelling and composition; also practice in public speaking and debating.

(B) **History**, part of one or more years, with special reference to current and local history.

(C) **Citizenship**, part of one or more years, with emphasis on rural community conditions. Bulletin No. 650 of the United States Bureau of Education is a suggested guide.

(D) **Government**, part of one or more years, including state and national.

study and project work are advised to devote the other half to regular high school subjects.

Fortunately the tendency in high school administration is to give first place to subjects of greatest value to pupils who complete their schooling with the high school; and in the first and second years, to subjects of greatest value to pupils who do not remain in high school more than two years.

Such subjects are becoming available. Agricultural pupils are urged and expected as a rule to take them. Two non-agricultural subjects at a time should run parallel with the agricultural, and now may very generally be selected from such a list as the following:

(A) **English**, every year, appreciation and expression, to develop power in oral and written composition and to give a love for good reading.

(B) **Social science**, including history, two years. Community civics, with some such guide as United States Bureau of Education Bulletin No. 650, may be offered the first or second year, and a good course in civics and economics in the third or fourth.

(C) **Natural science** is generally offered every year about as follows: first year, elementary general science with some reference to the rural environment; second year, biology of plants, animals, and man; third and fourth years, generally alternating, physics and chemistry with some attention to agriculture.

(D) **Drawing**, mechanical and free-hand, when offered, should be of

tional government in the United States, but especially the local town or city government and the duties of local administrative officers.

(E) **Economics**, part of one or more years, including economic history, and such problems as those of

much value to the agricultural pupil in developing his powers of observation and representation, and some skill in the use and care of drawing instruments.

(E) **Shop work** is sometimes offered, and should give good training in the care and use of tools and

FIG. 182. — Farm woodlot and reforestation receive attention. Forest tree planting, on slopes too steep for orcharding, ended "Arbor Day." Homemaking department invited. Everybody in the school planted a tree. Smith School, Northampton.

capital, wages, rent, competition, cooperation, credit, transportation, marketing, and accounting.

(F) **Drawing**, part of one or more years, freehand and mechanical. Training of both eye and hand.

(G) **Hygiene and physical training**, part of every year, with drills in

experience in making and repairing farm equipment.

(F) **Business** courses are sometimes offered, including at least an introductory course in penmanship, typewriting, business forms and procedure, filing and farm accounts. Business arithmetic, bookkeeping, commercial geography, and commercial law may also be available. Such courses give an agricultural pupil valuable knowledge and skill for the betterment of farming as a business.

(G) **Physical training** is desirable and should be taken by the agricul-

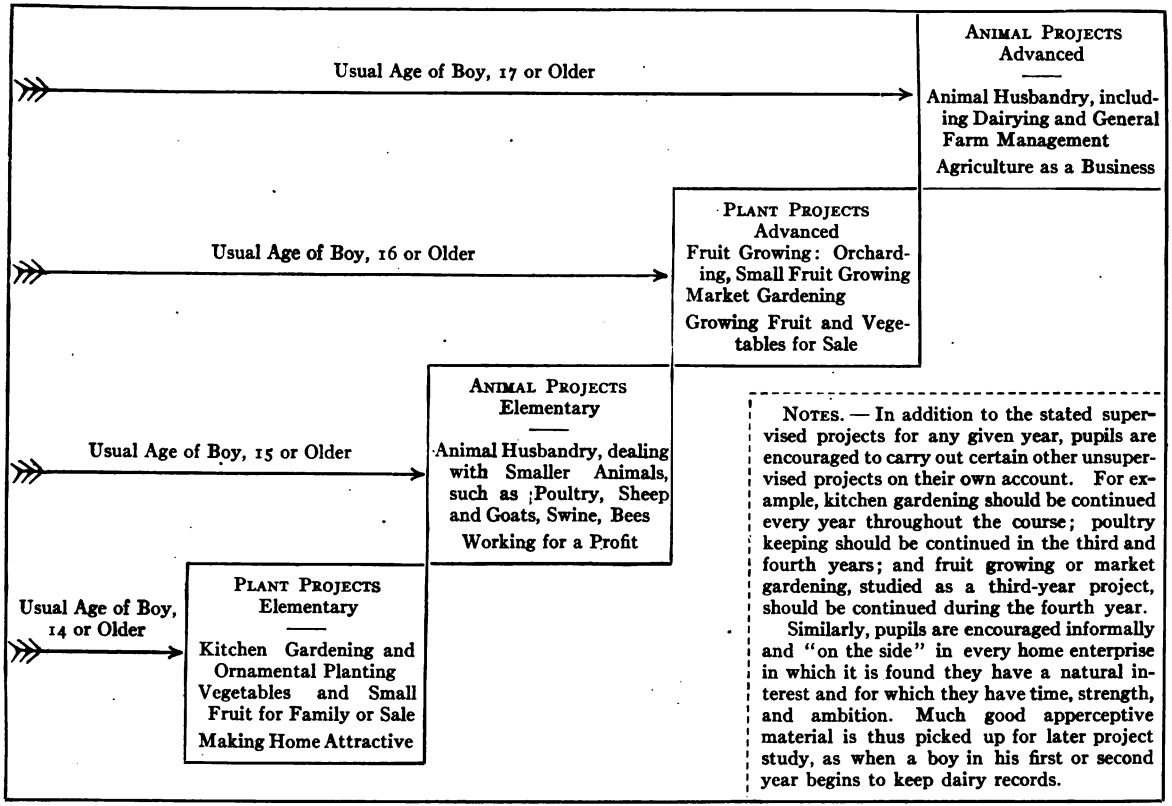



FIG. 183. — Fourth-year Animal Projects, Advanced. See "Note" above for "anticipatory" and "continuing" projects. Fourth-year projects are generally continued after graduation, with incidental or emergency help from the agricultural instructor. Thus as a boy grows up to manhood, his farming ability and interests grow. He may intelligently choose his specialty, or he may continue in general farming.

" first aid " and " setting up " exercises. Many farm boys are muscular, but misshapen and in need of symmetrical development.

(H) **Music**, part of every year, including class and school songs, school chorus singing, development of quartet or glee club, orchestra or band.

tural pupil. Gymnastics or calisthenics should be required of all pupils, except those excused on a physician's certificate that such exercises would be injurious.

(H) **Music.** — The Board of Education believes that every high school should devote a certain amount of time to singing, and that when the

FIG. 184. — Father strong backer of Hadley's Agricultural Department because it brings study to bear on home projects.

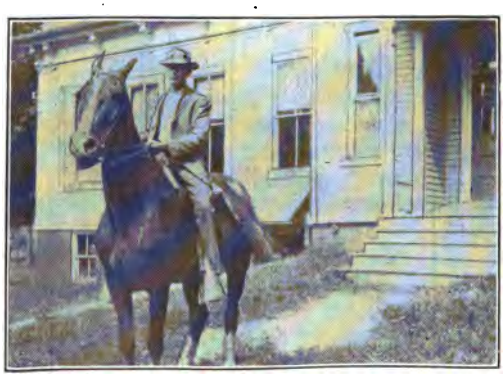


FIG. 185. — Boys who cannot attend full time are not neglected. Homer Greene rides in four miles for advice on feeding dairy cows. Hadley Agricultural Department.

number is large, classes should be formed sufficiently small to secure participation by all pupils. This should apply to agricultural pupils.

FIG. 186. — Dairying class studying fine Holstein herd of neighbor. Owner successful alfalfa grower. Admirable farm to watch. Smith School, Northampton.

FIG. 187. — Mr. Joseph Cook, member of advisory committee, practical farmer, showing fine points of one of his Holsteins. Helping coach boys for judging contest. Boy won state championship. Hadley Agricultural Department. Many Holstein fanciers in Massachusetts. D. W. Field Farm, Montello, Mass., home of "King Ormsby Jane Rag Apple," the $53,000 bull, a son of "Rag Apple Korndyke 8th" and "Ormsby Jane Segis Aaggie, the Great White Heifer."

**CAREER MOTIVE — BETTER FARMING**

**VOCATIONAL EDUCATION AT A COUNTY AGRICULTURAL SCHOOL**
**For All-day Pupils has Two Parts**

| **Part 1. — Vocational Education** 80 Per Cent of Pupil's Time | | **Part 2. — General Education** 20 Per Cent of Pupil's Time |
|---|---|---|
| (1) **50 per cent in project study and project work, centering on:** | (2) **30 per cent "related study,"** consisting of such close correlation with the project study and project work of the following activities or subjects of instruction as to warrant the prefix "farm" or "agricultural": | **20 per cent cultural and good citizenship education** in such subjects as: |
| **A. Projects of the pupils.**<br>a. At home, as a rule.<br>b. At school, rarely.<br>c. Pupil responsible, but supervised by his instructor. | | |
| **B. Projects of the school.**<br>a. Illustrative of well-proved methods, crops, etc.<br>b. Trial, as to adaptability of promising methods, crops, etc., to local conditions.<br>c. School responsible, but uses projects for group instruction of pupils in observation and practice work. | Farm arithmetic<br>Farm biology<br>Farm physics<br>Farm chemistry<br>Farm entomology<br>Farm veterinary science | English<br>History<br>Citizenship<br>Government |
| **C. Substitutes for projects.**<br>a. Work on approved farm, with agreed-upon educational duties as cost-accounting one or more cows or one or more crops.<br>b. Work on the school farm, with educational duties like the above.<br>c. Employer chiefly responsible, but pupil supervised by instructor. | Farm drawing<br>Farm shop work<br>Farm typewriting and filing.<br>Farm accounts<br>Farm journal reading<br>Agricultural economics | Economics<br>Drawing, free-hand and mechanical<br>Hygiene and physical training<br>Music<br>Recreation |

FIG. 188. — Diagram of County Agricultural School Education.

**CAREER MOTIVE — BETTER FARMING**

**VOCATIONAL EDUCATION IN A HIGH SCHOOL AGRICULTURAL DEPARTMENT**

**For Day Pupils should have Two Parts**

| **Part 1. — Vocational Education** 50 Per Cent of Pupil's Time | **Part 2. — General Education** 50 Per Cent of Pupil's Time |
|---|---|
| **Project Study and Project Work, centering on:** | **Cultural and Good Citizenship Education,** selected from one or more of the regular high school courses, and dealing with such subjects as: |
| (1) **Projects of the pupils.** | |
| **A.** At home, as a rule. | |
| **B.** Near home, occasionally. | |
| **C.** Pupil responsible, but supervised by instructor. | English, every year |
| (2) **Projects of the department.** | |
| **A.** At the high school, rarely. | Social science, including community civics and economics |
| **B.** Neighborhood demonstrations, as of pruning, spraying, hotbed making, or greenhouse work. | Natural science, including elementary science, biology, physics, and chemistry |
| **C.** Instructor responsible, but uses projects for group instruction in observation and practice work. | Drawing, freehand and mechanical |
| (3) **Substitutes for projects.** | |
| **A.** Work on approved farms, with agreed upon educational duties, as cost-accounting one or more cows or one or more crops. | Shop work |
| **B.** Employer chiefly responsible, but pupil supervised by instructor. | Business, including typewriting, business forms and filing, bookkeeping, commercial geography, and commercial law |
| (4) **Remark.** — The agricultural instructor must, as a rule, teach his boys the vital correlations between their projects and such subjects and activities as arithmetic, biology, physics, chemistry, entomology, drawing, shop work, accounting, filing, farm journal reading, and agricultural economics. | Physical training |
| | Music |
| | Recreation |

FIG. 189. — Diagram of High School Agricultural Department Education.

(I) **Recreation**, part of every year, with special attention to a wholesome and pleasant country life. There should be supervised interclass athletics; boy-scouting; camera-hunting; minstrel shows and amateur dramatics; also pageants portraying memorable episodes in local, national, and world history. Music, physical training, and recreation may have much in common. The first two merit places on the regular school program. The last may well be developed coöperatively by staff and pupils; but it should be given serious attention by a committee of the staff, and a place on the regular program of the school.

(J) **Remarks.** — One who examines this list of non-agricultural subjects, and notes their limitation to 20 per cent of the pupil's time and the absence of such subjects as chemistry, should bear in mind that in the 30 per cent of time reserved for the " related study " above outlined, a grasp such as is seldom realized in a high school is had of many subjects, some of which might be listed as agricultural arithmetic, accounts, typewriting, drawing and shop work, biology of plants, animals, and man, physics and chemistry. In short, the county school produces notable values in the general education of its pupils.

Fig. 188, above, presents in diagrammatic form the educational aims, requirements and advantages of the four years' course for all-day pupils.

(I) **Recreation**, part of every year, should receive a fair share of the attention of the department, as it does of the school. Agricultural pupils have often been the best athletes, speakers, and musicians in their high schools. The agricultural instructor should constitute himself a committee, or coöperate with others in a larger committee, for promotion and supervision of forms of recreation which will lead to well-rounded, wholesome, and pleasant country life.

Fig. 189, above, presents in diagrammatic form the educational aims, requirements, and advantages of the four years' course for day pupils.

### 7. Qualifications of Teachers

In view of the foregoing discussion of courses of study, it will be evident that the make-up of the teaching staff of a county agricultural

school will be radically different from the make-up of a high school staff. The high school has a divided aim, in that it admits some pupils whose career motive is farming, and other pupils with various other career motives; whereas the county agricultural school admits only those who desire to prepare themselves for better farming. The qualifications of the special instructors for agricultural departments

FIG. 190. — "Dolly Dimple," "Queen of the Guernsey Milkers." Class studying "dairy type" in 1914 at Longwater Farms. Owner, Mr. F. Lothrop Ames, sold 75 Guernseys at auction, Oct. 10, 1916, for average of $1092; and, at Lake Forest, Ill., May 16, 1918, in consignment sale got up by American Guernsey Cattle Club, sold 7 for average of $3400, the average of 5 of this consignment being $4600. North Easton Agricultural Department.

are of the same general nature as those of the teachers of agricultural projects and related studies in a county school.

At the outset it should be stated that the Board of Education does not appoint instructors nor fix salaries.

It should also be stated that under certain conditions aids and assistants are approved, but that candidates for such positions must have the academic training of an instructor, and have had the equivalent of three years of experience in approved farm work.

(1) **Fitness for particular position.** — The Board of Education does not base its "preliminary approval" of applicants for agricultural instructorships upon any plan of general certification. The Board is on the lookout for good men for this work, and has an extensive list of specially qualified men which may be drawn upon, but directors and superintendents are at liberty to look elsewhere for candidates.

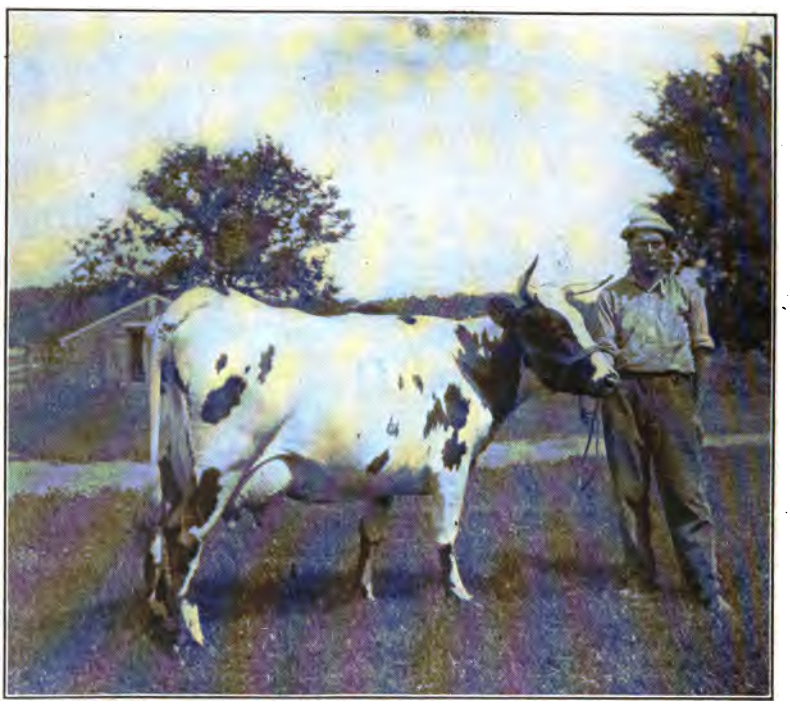


FIG. 191. — Favorite of the school herd of pure-bred Ayrshires, "Sweet Marie of Woodside." Good example of "dairy type." Bristol County Agricultural School.

Often advisory committees are invited to coöperate in choice among candidates, and, of course, bring to the task exceptional knowledge of the special requirements of local farming. Each applicant is measured by his apparent degree of fitness to meet the requirements of the position for which he may be considered.

(2) **Not passed upon once for all.** — "Preliminary approval" of qualifications of teachers by the Board of Education is withheld unless there is reasonable assurance that a given applicant is of such steady purpose as to be disposed to remain in the position for which he is considered at least two years, and otherwise qualified to last not less than two years. The qualifications of teachers are subject to constant review, and appointments as such carry with them no certainty

FIG. 192. — Equipment for sanitary milk production, — cooling, bottling, etc.; also for making butter and fancy ices. Essex County Agricultural School.

of permanent employment. Each instructor's future, however, may fairly be said to be in his own hands. Permanently valuable service should mean permanent tenure of office.

(3) **Qualifications for improvement.** — Fundamental qualifications are capacity and determination to improve during service. These are the best guarantees of permanent efficiency and consequent tenure of office. Professional improvement is required of every instructor.

**A. For improvement in farming.** — Part of every year each project instructor is required to do such work, apart from his teaching of all-day pupils, as shall give him a better and better mastery of those

branches of farming which are practiced in, or which are believed by his advisory committee to be possible for, the localities from which his pupils are drawn. Of the annual period set apart for duties of professional improvement, one month is generally devoted to betterment in farming.

*Photo. by International Film Service Inc.*

FIG. 193. — Miss Ruth Wood, Essex County Agricultural School, who won second in the dairy-judging class at the National Dairy Show in Springfield, Mass., in competition with ninety-seven boys representing ten northeastern states. She chose this bull-calf for her prize, "Sophie 19th's Tormentor 10th." See her report on pages 432–434.

**B. For improvement in teaching.** — No instructor can take up his duties prepared once for all to teach the relations of science to practical farming. New relations are constantly being found. Consequently, just as one month, more or less, a year the project instructor is taken away from boys and put at work with adult farmers, either in his locality or at a distance, so for a like period every year he and the teacher of "related studies" are taken away from boys and put with adult experts in technical and scientific agriculture for the express purpose of enriching the teaching program with carefully selected or prepared exercises of obvious value to their pupils.

Men of such maturity and of such thorough training in practical farming are required in Massachusetts, that most of the project instructors and supervisors have entered on their duties without previous training or experience in teaching. Therefore, profes-

sional improvement must generally include study of principles and methods of teaching. In a given case, winter work on technical agricultural subject matter may be combined with a seminar course on teaching as teaching, — on the "tricks of the teacher's trade." Vocational agricultural education is one of the newest fields of education, and one of the most attractive for creative and constructive work in preparation for better teaching.

Teachers of non-agricultural subjects devote two months in summer to "professional improvement" work, and divide their time between experience in, and agreed-upon studies of, country life, including study of the home conditions of their pupils, on one hand, and, on the

FIG. 194. — Comparing weight of cream with weight of milk. Concord Agricultural Department.

other, enrichment of their teaching programs with materials and exercises for the development of those tastes and aptitudes which make the farmer expert and a gentleman.

(4) **Agricultural college training** is highly desirable. Equivalents have been approved, such as exceptional private study and farm experience, and successful teaching has followed.

(5) **Lifelong farm experience** is almost indispensable.

(6) **Certain differences** between schools and departments may be noted, as follows:

### A. County school

**(A) Vocational aim.** — The Board of Education has a voice in the choice of all teachers for the county school staff. This insures harmony of aims on the part of the several instructors and a cordial coöperative spirit in the staff.

### B. High school department

**(A) Vocational aim.** — The Board of Education has a voice in choosing only the teacher of agriculture.

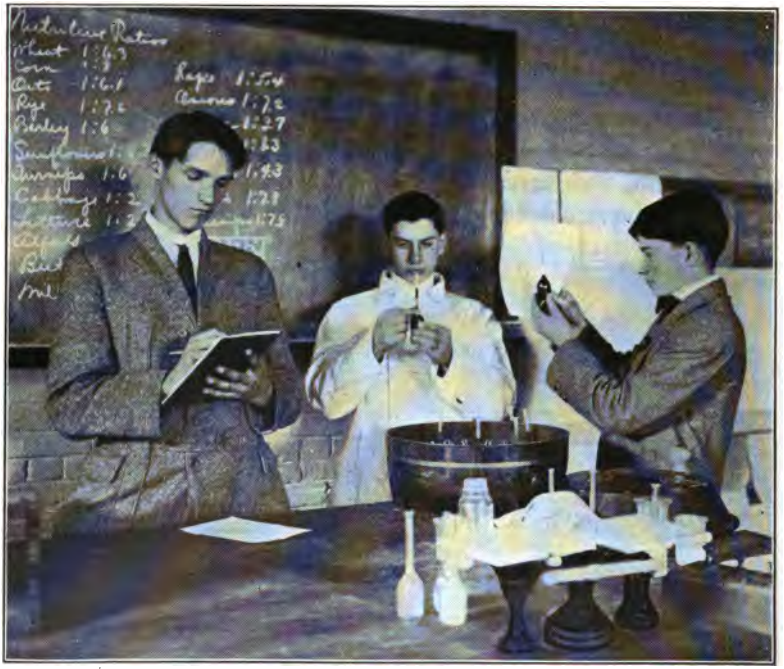


FIG. 195. — Testing milk for butter fat. Babcock tester of fundamental importance. Cow of boy at right netted him $108, but then nearly ate her head off within the year. His record exposed her. Note nutritive ratios on blackboard. North Easton Agricultural Department.

Cordial coöperation between the agricultural instructor and other members of the high school staff may, however, be secured through the superintendent of schools. With him rests selection of candidates for consideration by the school committee, and nomination for appointment of the preferred candidate or candidates. He may,

(B) **Specialization.** — Specialization is possible in almost any school. A school with an enrollment as low as 50 or 60 is warranted in employing 4 teachers and in choosing specialists. therefore, provide in advance, through his nomination of candidates, for team work in the high school staff in the interest of the efficiency of each of the courses offered by the high school, including that in agriculture.

(B) **General adaptability.** — Specialization in a department is only possible where the enrollment is such as to require two or more instructors. Generally, choice among candidates

FIG. 196. — Agricultural pupils demonstrating and explaining Babcock test before elementary science class of regular high school course. Such exercises promote interest, efficiency, and good feeling. North Easton Agricultural Department.

In such a case the qualifications of the 4 specialists are such as to safeguard, not merely the proper execution of school and home projects, but their well-balanced study, with due attention to the non-agricultural, as must rest with a man who is qualified to teach the major projects of the four years' course above outlined. Experience has proved that it is possible to find capable instructors of this all-round type.

well as the agricultural, education of the pupils.

a. **Agricultural.**—A county school is called upon to serve the agricultural interests of the entire county, including those of suburban residents who must, of necessity, restrict their operations to such projects as poultry keeping and gardening. A suburbanite who is a graduate of an agricultural college, and who has had four calendar years of successful experience in gardening and poultry keeping, may be better qualified than candidates of lifelong farm experience for meeting the needs of such people in part-time or evening class instruction. Generally instructors of this type may be hired for considerably lower salaries to begin.

The county school, with an enrollment of 100 or more pupils, may have need of, not merely specialists as heads of departments, but of a considerable number of assistants. A man may qualify for an assistantship who could not qualify for an instructorship in a high school department, because responsibility will be divided between the assistant and the head of his department for both supervision and instruction.

An assistant who proves to be a successful teacher may broaden his field of service year by year, and thus be able to qualify for a position as head of a department or as an agricultural instructor in a high school.

b. **Non-agricultural.** — No teacher in such non-agricultural subjects as English is selected who is not qualified by natural leanings, and if possible by some practical experience, to appre-

Not "college boys," but men of maturity are generally demanded.

Now and then a mature man who is not an agricultural college graduate, but who has developed the right kind of talent, both in the success of his practical farming and in his powers of presenting ideas in connection therewith, has qualified for an instructorship.

**MINIMUM QUALIFICATIONS OF PROSPECTIVE INSTRUCTORS**

**For County or Separate Agricultural Schools and High School Agricultural Departments**

| 1 Specifications | | 2 Farm Work Instructor | 3 Related Study or Technical Instructor | 4 Farm Work and Related Study Instructor | 5 Non-agricultural Instructor |
|---|---|---|---|---|---|
| (1) Age | A. Without successful teaching experience. | 21 | 21 | 21 | No such applicant considered. |
| | B. With successful teaching experience. | 21 | 21 | 21 | 21 |
| (2) Farm experience | | Eight calendar years under farming conditions like those in Massachusetts. | Two calendar years, and vacations during agricultural school or college course. | Eight calendar years in farming, if only special agricultural courses have been taken; 4 calendar years in farming, if 2 years or equivalent in agricultural courses have been taken. | Knowledge enough of farming to enable the instructor to understand the aim of vocational agricultural education, and a natural inclination toward the betterment of country living. |
| (3) Academic education | | Grammar school graduate | High school or agricultural school graduate. | High school or agricultural school graduate | College or normal school graduate |
| (4) Technical education | | Special courses in agriculture. | Two years or equivalent in agricultural courses. | Two years or equivalent in agricultural courses. | Courses in subjects to be taught. |
| (5) Professional education | | Approved study of home-project methods of teaching agriculture. | Courses in home-project methods of teaching agriculture and related studies. | Approved study of home-project methods of teaching agriculture and related studies. | Course in pedagogy, and one year of successful teaching experience. |
| (6) Personality | | Satisfactory and with presumption of ability to handle pupils (Personal interview required.) | | | |
| (7) Physique | | Good health (attested by physician's certificate) and no deformity. | Good health (attested by physician's certificate). | Good health (attested by physician's certificate) and no deformity. | Good health (attested by physician's certificate). |
| (8) Sex | | Men only. | Men only. | Men only. | Men only. |

FIG. 197. — Diagram of Minimum Qualifications of Candidates for Agricultural School and Department Instructorships in Massachusetts.

ciate and to contribute through his instruction to wholesome and pleasant country life.

(C) **Salary expectations.** — Salaries range from $900 upward. The highest salary now being paid in a separate school to a teacher is $2000 a year.

(D) **Skill and speed.** — No man is qualified to teach agriculture who is not naturally interested in both the study and the practical work involved in the field of his specialty or specialties, and who is not able and willing to lead his boys in the practical execution of projects, and to conduct profitable projects on the school farm.

(E) **Minimum qualifications** for the various instructors in a county school are listed on the preceding diagram, Fig. 197.

(C) **Salary expectations.** — Salaries of not less than $1200 a year must generally be offered to beginners; $2200 a year is the highest salary now being paid an experienced and successful department teacher.

(D) **Skill and speed.** — No man can be considered qualified for an agricultural instructorship who is not a good teacher, and both able and willing to lead his boys in their practical work for the purpose of setting them a proper pace and giving them proper training for those phases of farming which require special skill.

(E) **Minimum qualifications** for agricultural project instructors are listed in column 4 of the preceding diagram, Fig. 197.

FIG. 198. — Bad shoulder at left. Too straight. Neck always sore in summer. Horse became vicious as result. Bad leg at right not properly cared for. Smith School, Northampton.

## 8. Methods of Instruction

(1) **Home-project visitation.** — So far as project teaching is concerned, the methods of instruction by supervisory visitation of home projects are uniform for both schools and departments. These

methods have been described in section 6, in setting forth the requirements and advantages of the courses of study.

(2) **Lantern slides and charts,** prepared by experts and lending themselves to vivid presentation of facts and principles of vital concern to

FIG. 109. — Farm mares keep number good. One of their promising colts at right. Center, perfect shoulder. Excellent farm models. Good horses help good dairying. Smith School, Northampton.

practical farming, are now available in great abundance. They may be bought or borrowed, and methods of instruction by which they are brought into use are common to both schools and departments.

(3) **The following differences** should be noted:

**A. County school**

**(A) Correlation controlled.** — The director of the school has control of all teachers, and sees to it that methods of instruction are followed which give each pupil a well-knit body of knowledge by means of the closest possible correlation of the subjects studied with the interests and activities of efficient farming and well-balanced country life.

**(B) Group instruction and individual.** — The school laboratories and shops offer advantages superior to those of the rural high school for

**B. High school department**

**(A) Correlation voluntary and variable.** — The agricultural instructor has no direct control over methods of instruction other than his own. Though difficult, it is none the less desirable that he and his superintendent of schools spare no pains in showing other teachers the advantages and methods of correlation, and in persuading them to adopt such methods for the good of the agricultural pupils.

**(B) Individual instruction and group.** — Lack of farm land and limited agricultural laboratory and shop equipment at the high school

group methods of instruction; consequently, the tendency is for instructors to teach pupils as groups.

The problem of the county school is to adopt such methods as shall secure proper attention to the pupils as individuals.

The school may be expected to excel principally in the educational benefits which follow group methods.

(C) **Scientific and practical.** — Excellence of laboratory facilities and congestion of numbers not only accentuate the tendency toward adoption of group methods of instruction, but make group teaching difficult in both the laboratory and the practical aspects of the training of agricultural department pupils.

The problem of the department is to develop its headquarters into a combined study room and agricultural science laboratory, and, at school and on neighboring farms, to provide for a fair proportion of group instruction.

The department may be expected to excel principally in the educational benefits which follow methods of individual instruction.

(C) **Practical and scientific.** — Lack of good laboratory facilities and limitation of numbers to not more than 20 pupils to the instructor not only accentuate the tendency towards

FIG. 200. — Types in demand for mounts. Blue-ribbon thoroughbred hunter, "Mountaineer," at left. Heavy Irish hunter at right. Saddle and draft types contrasted same day. Longwater Farms, North Easton Agricultural Department.

also tend to overemphasize the scientific aspects of the education of the pupils. Another problem of the school, therefore, is to see to it that its methods of instruction shall not be too much scientific and too little practical.

**(D) School and home farm.** — The school farm with its illustrative and trial projects tends to focus the attention and to engross the energies of both instructors and pupils on teaching at the school. This tendency is further accentuated by congestion of numbers, particularly when village and city boys with work provided for them at the school constitute a considerable part of the enrollment.

The school cannot evade the reasonable expectation of the public that its farm, in all phases of its work, shall be a model of profitable methods, not only for its pupils, but also for the countryside.

Distance between the school and the scattered homes of its pupils who live on farms tends to exalt economy a considerable proportion of village and city boys to contend with.

Its fundamental requirement is that all applicants prior to their admission must make arrangements for projects, or acceptable substitutes, at or near home.

Distances are short for both pupils and instructor.

Thus the interest of both instructor and pupils tends to be not centripetal, but centrifugal, — not inward toward things done at school so much as outward toward the separate project and substitute for project responsibilities which are being carried by individual methods of instruction, but also tend to overemphasize the practical aspects of the education of the pupils. Another problem of the department, therefore, is to see to it that its methods of instruction shall not be too much practical and too little scientific.

**(D) Home farm and department.** — The department has no extensive farming operations on its premises, and no congestion of numbers with

FIG. 201. — Studying the draft type. Imported Clydesdale stallion. Pure bred "Clyde" colts in background. Note use of score cards. All field trips are carefully planned and results are checked up. Longwater Farms. North Easton Agricultural Department.

of supervision above the home farm efficiency of the pupils.

The tendency to center study and work on the school farm and to exalt its successes is but natural.

Consequently the supreme problem of the school is to adopt methods of instruction which shall insure model farming at the school, but at the same time make this but a means to the best possible farming of its pupils at their several homes. And in working out this problem the distant home must have equal consideration, week by week, with the home that is near.

No methods of instruction not in keeping with those indicated in the last paragraph will be approved by the Board of Education as either economical or efficient for this type of school in Massachusetts.

the individual pupils at, or near, their several homes.

Methods of instruction in furtherance of this outward and distributive tendency, by which knowledge and skill gained at the department are put at once to work on home farms by the pupils throughout the farming section tributary to the high school, have the heartiest approval of the Massachusetts Board of Education.

For this type of department no methods not in keeping with those just mentioned will be approved by the Board as either efficient or economical.

### 9. Conditions of Admission

Conditions governing the admission of pupils are uniform for both school and department.

(1) **Age restrictions. A. Fourteenth birthday.** — No pupil may be admitted until he has passed his fourteenth birthday. No pupil "who does not possess such ability to read, write, and spell in the English language as is required for the completion of the fourth grade of the public schools of the city or town in which he resides" may be admitted. (See Revised Laws, chapter 44, section 1.)

**B. Sixteenth birthday in some cases.** — No pupil may be admitted to an evening class until after he has passed his sixteenth birthday.

**C. Twenty-fifth birthday in some cases.** — No pupil may attend an all-day or a part-time class after he has reached his twenty-fifth birthday.[1]

(2) **Good character.** — Vocational education is not reform schooling. Only pupils of good character are admitted.

[1] This top limit has been removed by the Legislature for the period of the present war with Germany and for one year thereafter.

(3) **Career motive.** — Vocational agricultural education fits for the "occupations connected with the tillage of the soil, the care of domestic animals, forestry, or other wage-earning or productive work on the farm." These occupations are held to include productive work on general farms, on highly specialized farms, in market gardens, in greenhouses, in parks and cemeteries, in ornamental planting required by larger or smaller estates, and even on restricted areas which permit only of such small operations as the keeping of a pen of poultry or the making of a home garden. Only those who intend to prepare themselves for these occupations are admitted.

FIG. 202. — School colt and boy who cared for her. See Fig. 203.

(4) **Physique.** — For centuries farming has been, in most cases, a family enterprise, with a multitude of duties and tasks suited to all ages, to both sexes, to the big and to the little, and to varied degrees

FIG. 203. — The same colt as two-year-old, and the boy who trained her to drive. Bristol County Agricultural School.

of health this side of complete physical incapacity. To-day in Massachusetts farming is, in the main, a calling for men, and is dependent for success upon strength and vigor. As a rule, only applicants of good health and rugged physique are encouraged to undertake the responsibilities of a four years' course.

(5) **Facilities for home projects or acceptable substitutes.** — Requirements for admission to vocational agricultural courses may be said to be practical rather than academic. Each applicant must,

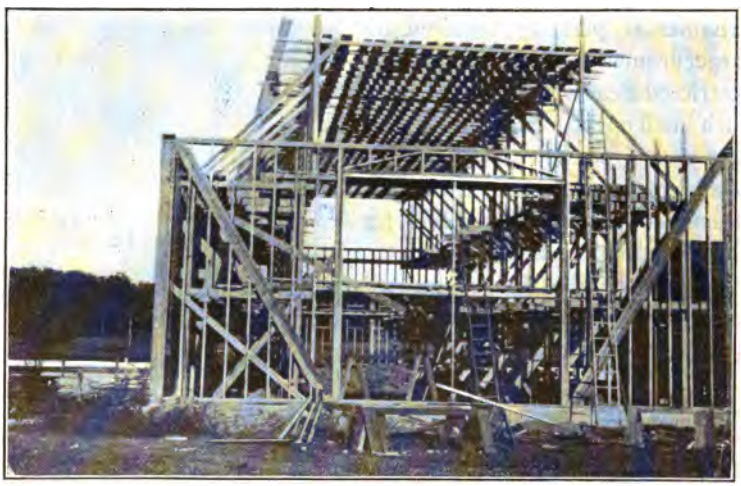


FIG. 204. — New plank frame barn. Construction keenly studied by pupils. But barn was built by contract. Bristol County Agricultural School.

prior to approval for entrance, establish a fair presumption that he will profit from the instruction. To this end it must be shown that he will have opportunities for productive agricultural employment, at home or elsewhere, throughout his proposed period of training.

(6) **Non-resident Pupils.** — A pupil from a town, city, or county that does not maintain an agricultural school or department which gives the type of training desired may, with the approval of the State Board of Education, be admitted to the agricultural school or department of his choice; and his tuition, at a rate fixed by the Board of Education, must be paid by his home town or city. His town or city,

in turn, is reimbursed by the State to the amount of one-half the sum paid for his tuition. Thus all towns and cities share equitably in both expense and state-aid, and all residents eligible for admission may share and share nearly alike in the benefits of this kind of education.

### 10. Employment of Pupils

Vocational agricultural education establishes such a vital contact between study and work that it is impossible to approve a pupil's instruction in one without consideration of the other.

(1) **Approved employment.** — Since approval of the employment of pupils rests with the Board of Education, the Board has laid down

FIG. 205. — Agricultural pupils erect minor structures. Building a tool and wagon shed. Learning to do by doing. Smith School, Northampton.

certain principles and regulations by which it is governed in its approval of employment.

**A. Agricultural versus non-agricultural employment.** — As a check upon the "career motive" of the pupil, instructors are required to report upon the non-agricultural, as well as the agricultural, employment of their pupils. If the non-agricultural employment were to predominate, there would be serious question as to the propriety of retaining a pupil in an agricultural class. As a matter of fact, the ratio, on the average, of agricultural to non-agricultural employment

has been so much in favor of agriculture as to indicate that proper precautions have been observed in choosing for admission pupils who seriously intend to follow agricultural careers.

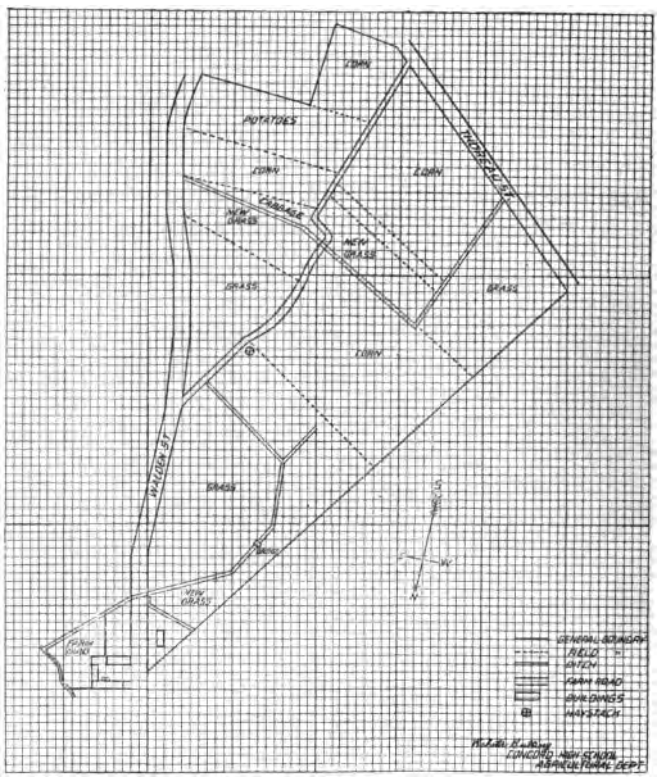



FIG. 206. — Best systems of crop rotation and farm management are taught. Plans of their own farms and of other farms, like the above, are drawn to scale. Instructor Doolittle has adapted quick and simple military mapping to farm needs. The above plan was drawn by a pupil from a sketch made with a stiff notebook cover, a foot ruler, a pocket compass, a 50 ft. tape, and squared paper. The farm roads were in red ink. Concord Agricultural Department.

**B. Routine versus educational agricultural employment.** — As a check upon mere farm " chores " or mere " gang labor " in farming, the instructors are required to report not only upon the projects or

substitutes for projects which the pupils have carefully planned and are studying, but also upon their other farm work. All projects and substitutes for projects are agreed upon in advance. This has been made clear by the foregoing discussion of courses of study. Employment records are the basis of final approval, and are evidence that the educational bargains entered into by pupils and parents, or employers, on one hand, and the school on the other, have been kept.

**C. Work versus recreation.** — The pupil's right to a reasonable amount of time for recreation is recognized. For the light they

FIG. 207. — Dairy and cash crop projects go well together. Home projects of this boy, one cow and ¾ acre potatoes. Farm earnings, from farm work and projects, $220.13. Petersham Agricultural Department.

throw on the career motives of the pupils, and for the help they give in balancing up their activities, the instructors are requested to keep records of the amount of time devoted to recreation and of the kinds of recreation followed. Such records are expected to throw some light upon the happy solution of the problem of making the country a pleasant, as well as a profitable, place of abode. The vocational activities of the pupils, however, so far predominate as almost to warrant the inference that playing the man in carrying out productive farm enterprises leaves relatively little time and less desire for such activities as those of the city or village playground.

**D. Pupils on farms versus other farm workers.** — The right of pupils to a decent place of employment is recognized. In approving projects away from home, or substitutes for projects, care is taken that the conditions under which the pupils are to work shall be wholesome. The county school, especially, is careful to employ the best farm help obtainable, because of the close association of pupils with other members of the working staff. Boys need to be taught high standards as to farm help no less than as to farm products. Because,

FIG. 208. — Mangels for succulent winter feed for dairy cows in home project. Grown because boy has no silo yet. Petersham Agricultural Department.

however, learning how to work with farm help is not less important for the boy who does not expect always to be a wheelbarrow or a one-horse farmer, than is learning how to handle land or live-stock, boys would better be taught farming shoulder to shoulder, at least part of the time, with average farm laborers, than to be kept too much by themselves.

**E. Employment adjustments by schools and departments.** — There are certain marked differences between the school and the department, with reference to the approved employment of agricultural pupils. They may be listed as follows:

**(A) County school**

**a. Fifty-week year.** — The school farm is in continuous operation throughout the calendar year. Where most of the work is done by pupils, there are generally pupils at

**(B) High school department**

**a. Forty-week year.** — High school agricultural departments, as a rule, have no land and no live-stock. They are in session, from the agricultural point of view, only when the

FIG. 209. — Pupil mowing second cutting of alfalfa. Each boy is given a full round of farm training. Bristol County Agricultural School.

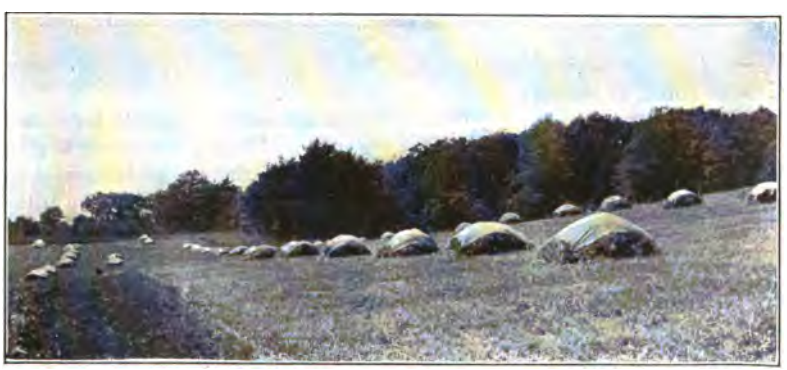


FIG. 210. — Curing the second cutting of alfalfa on the school farm. A very successful crop here. A part of the school dairy project. Bristol County Agricultural School.

the school throughout the calendar year. Certain study time and vacation divisions, however, from the point of view of the individual pupil, may be noted, as follows:

FIG. 211. — Raking a good crop of timothy. This city boy from Fall River wants to be a farmer and is learning how to do by doing. Bristol County Agricultural School.

agricultural instructor is on duty. As a rule, the agricultural instructor is on duty from March 1 until Thanksgiving, a period of forty weeks.

Occasionally, a special instructor is employed during the winter to give a three months' course in farm-shop work or in such subjects as farm arithmetic and accounts. When this instruction is approved as vocational, the school year of the department is lengthened to approximately fifty weeks.

The study time and vocation divisions of a department are generally as follows:

(a) **Study time.** — The classroom instruction generally begins in September, ends in June, and covers a period of about thirty-six weeks. The summer is thus left free for the heavy outdoor farming operations in which pupils participate at their homes or elsewhere. In some ways, of course, the summer is the best time for study of the whole year, particularly in connection with plant projects. To stimulate non-classroom study, pupils are called together from time to time for observation and practice work connected with the seasonal progress of field, garden, and orchard projects. Keen observation and careful study are further stimulated by

(a) **Study time.** — The high school generally opens early in September and closes late in June. Agricultural pupils generally enter in September, are with the agricultural instructor until Thanksgiving, resume work with him March 1, and continue to be given class instruction by him until the close of the high school in June. Projects are planned which run throughout the summer and are supervised by the instructor. In some ways the summer is the most profitable study period of the year. Pupils are brought together occasionally for group instruction, but for the most part are taught individually. This applies both to their

FIG. 212. — Putting the timothy under cover. The shadows are lengthening, and there are no laggards among these boys and their instructors. Bristol County Agricultural School.

the supervisory visits of the instructors to the individual pupils, at their homes or other places of agricultural employment.

(b) **Vacation time.** — The study time is divided into three terms, separated at Christmas and Easter by brief vacations. A total of approximately three weeks a year may be said to be reserved for vacations of pupils. Where pupils are employed at the school, vacations must be so adjusted as to safeguard the routine work of the school.

observational training and to their practice work. Thus the school year of the agricultural department pupil generally covers forty weeks, of which the time set apart for agricultural study at the school covers about twenty-eight.

(b) **Vacation time.** — Agricultural pupils, as a rule, either take special high school subjects three months during the winter, or are taught vocational agricultural subjects three months. Thus their vacation time during the school year generally corresponds to that of the regular high school pupils.

Occasionally a pupil, hard worked at home during the summer, and early and late daily during term time, prefers a half-vacation during the winter absence of his agricultural instructor, and comes to the high school only half the day to continue

FIG. 213. — Use land for blackboard. Good looking ears, "crib selected," were planted on this test plot. Germination test omitted. Common farm practice. All kernels from one mother ear, in one row; all from another, in the next; etc. Cabbages interplanted where corn failed to grow, to keep land working. Smith School, Northampton.

FIG. 214. — Note contrasts in yields; for example, row 17 as against row 22. If weak had been mixed with strong, loss would have been the same, but not so evident. Smith School, Northampton.

FIG. 215. — Contrasts in yields of ears equally marked. If photographed, such tests need not be too often repeated. Other sorts of tests may be made. Perfectly uniform stand of corn same year on another field where corn was tested before planting. See Fig. 217. Smith School, Northampton.

**b. Six-hour day.**— The home-project plan which, as has been stated before, is a no-dormitory plan, and which, accordingly, enables pupils, almost without exception, to live at home throughout the year, restricts the amount of time which may be claimed from the pupils for class instruction at the school.

Generally, however, pupils are able to look after their live-stock projects in the morning and arrive at school by 9 o'clock. They are also able to remain at the school until 4 o'clock in the afternoon, and still reach home in time to attend to their live-stock projects at night. When plant projects require more time at home the entire day is spent there, or a half day, when the instructor in charge of the project of a given pupil so directs.

Practice work on projects of the school is done in school hours.

without interruption the high school subjects upon which he has entered and which he is desirous of completing with the regular high school pupils.

Occasionally, again, graduates of high schools enter the agricultural department as part-time pupils, taking nothing but agriculture. They sometimes prefer to devote their entire time during the winter to farm work. This is not for them, by any means, a three months' vacation in the ordinary sense of the term; it is time which they are at liberty to spend away from the high school.

Pupils sometimes spend these winter months in a short course at Massachusetts Agricultural College, specializing in some department such as the dairy or the greenhouse.

**b. Three-hour day.** — The agricultural department does not claim, as does the school, the entire school time of the pupil. It is entitled to only one-half of the regular high school day in the case of any given boy. In some high schools there is a single session. The Board of Education is advising two sessions. An agricultural department cannot count upon more than three hours a day of school time. The younger pupils are usually taught in a group one-half the day, and the older pupils in a group the other half. The department, therefore, generally is in session six hours a day, but the individual pupil is accountable to it for only three.

The nearness of the homes of the pupils to the high school makes it easily possible for the agricultural pupils to do the necessary work with

their live-stock projects in the morning and still be at school on time, whatever the opening time of the high school may be; and after the close of the high school day there is ample time for doing the afternoon work on the live-stock projects. When plant projects require more time than that available before and after school, the half day which belongs to the agricultural department is spent at home. It is understood that in an emergency the entire day may be spent at home without subjecting the pupil to high school discipline. The group plan of teaching is intended to obviate the necessity, except under the most critical conditions, of taking a boy away from non-agricultural classes. Whenever a crisis arises the agricultural instructor is scrupulous about making arrangements in advance with other teachers for excusing the boys from high school subjects to work upon their projects. Emergencies rarely arise which cannot be met within the time which properly belongs to the agricultural department.

Where a department has land, practice work on the projects of a department is done in school hours.

c. **Supplementary time.** — The six-hour day in school is supplemented by whatever time is required out of school, including the growing and harvesting seasons, for the successful execution of projects, or substitutes for projects, agreed upon.

c. **Supplementary time.** — The three-hour day in school is supplemented by whatever time is required out of school, including the growing and harvesting seasons, for the successful execution of projects, or substitutes for projects, agreed upon.

d. **Certain percentages** of the entire time allotment of pupils mentioned in the discussion of approved "organization" and "courses of study" are required, as follows:

d. **Certain percentages** of the entire time allotment of pupils above mentioned in the discussion of "organization" and "courses of study" are as follows:

(a) **Fifty per cent** of time for project study and project work.

(b) **Thirty per cent** of time for "related study."

(c) **Twenty per cent** of time for non-agricultural study.

(a) **Fifty per cent** of time for project study, "related study" and project work. This is required.

(b) **Fifty per cent** of time for non-agricultural study. This is optional with the pupil.

**F. School records of employment** of the individual pupils are kept. These are used in part as a basis for the approval of a school or department for state aid. They conform closely to those required in other branches of vocational education, show the kind of experience

FIG. 216. — "Corn is King" for the Massachusetts dairyman. For class selecting mother ears and preparing germination tests for second season of corn improvement project, see Fig. 242. Here checking up germination test. Strong ear, 100%, right. Weak ear, left, will not be used for planting. Concord Agricultural Department.

gained, the "time factor" and the "balance of training," and may be listed as follows:

(A) **Study records**, of course, are kept by the instructors. These include the standing of pupils from day to day in both agricultural and non-agricultural subjects.

(B) **Daily and monthly time, temperature, weather, and account sheets** are kept by the pupils on forms approved by the Board of Education. The project accounts and reports required by the Board of Education on farm and non-farm earnings are based upon items listed daily and summarized at least once a month by each pupil. Column rulings or code devices are adopted which show what items are cash and what are credits for work or products in lieu of cash.

(C) **Photographic records** showing conditions under which their pupils are working and indicating their progress are made by the

FIG. 217. — Flint corn, ear-row test. Yields from different mother ears noted and seed ears selected prior to cutting. Breeding up. Smith School, Northampton.

instructors. These records are valuable in all cases, and particularly so in connection with products which are perishable.

(D) **Farm-practice sheets** are kept. These show the kinds of farm work in which the individual pupils have become skilled. A single large sheet has been approved. On this at a glance may be seen the degrees of operative efficiency with which the individual pupil has been credited by his various farm-work instructors. When pupils are admitted, they are asked to rate themselves on this sheet, in a column reserved for this purpose, in the kinds of farm work which they claim to have done; but their ratings by the school or department are based solely on details of farm work which instructors have reviewed or taught. These sheets meet the general requirement of

the Board of Education that state-aided schools shall keep " trade or occupational records."

(E) **Life history cards** are part of the general requirements of the Board of Education. The blanks are approved by the Board of Education, and are kept in proper files for ready and permanent reference. They show statistical facts desired, have appropriate sections for annual summaries of the study and work records, spaces for recording reports on schooling before entrance,

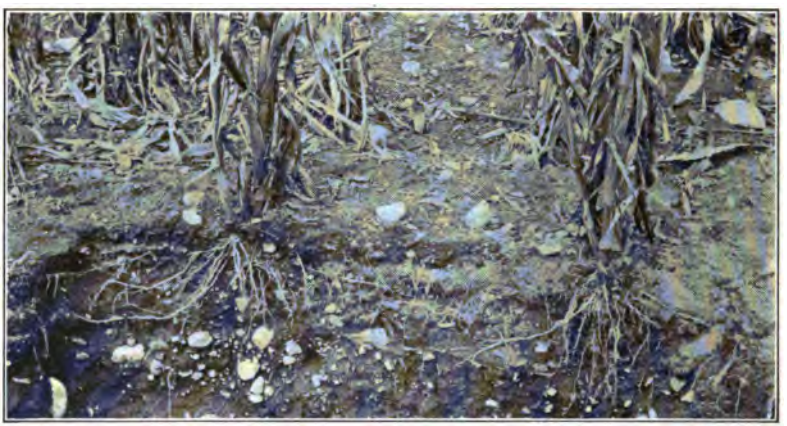


FIG. 218. — Corn roots. Excavation near corn hills. Roots gently washed out. Plain enough why cultivation should be level and shallow. "Related Study" exercise. Essex County School.

and of employment for five years after withdrawal and placement at work, of each pupil who has been trained by a school or department.

(2) **Employment honors.** — To give zest to, and public recognition of, capable agricultural school employment, the following mementos of success are provided:

**A. Prizes** offered by the State through the Board of Agriculture, by local agricultural fairs, and by other interested associations and individuals, may be won by pupils. Some of these are awarded for excellence in judging farm animals or other farm products; others, for farm products grown by the pupils.

**B. Certificates** are given pupils on creditable completion of short courses. These may be either typewritten or specially printed forms. In either case they show exactly what agricultural training the individual pupil has received.

**C. Diplomas,** which compare favorably with those given by other schools for pupils fourteen years of age and older, are awarded those who complete satisfactorily the regular four-year agricultural courses. These diplomas are not conferred in June, but at Thanksgiving

FIG. 219. — Freshmen ridding seed corn breeding plot of smut. Not only land, but corn itself must be kept clean. Hadley Agricultural Department.

after the projects of the fourth summer have been completed and reported upon.

(3) **Agricultural employment bureau** service is rendered the agricultural pupils by the schools and departments, both during their years of training and after withdrawal or graduation. The demand for them is much greater than can yet be met by the annual output of young men well trained for farming.

(4) **Supervision of employment** by the local agricultural instructors and by the agricultural representative of the Board of Education is thorough and businesslike, both during the courses of training and, where possible, after withdrawal or graduation. Preparation for

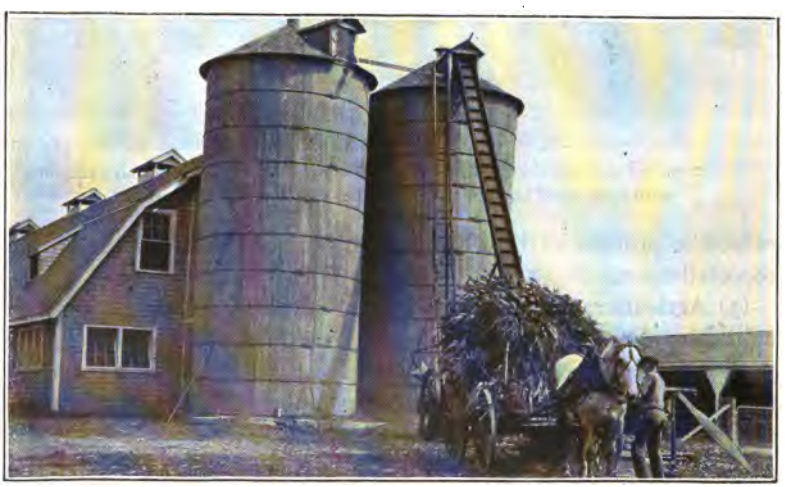


FIG. 220. — Boys haul the concentrates and fill the silos. A county school with complete farming equipment affords a limited group of city and village boys good farm training. But numbers must be kept small, or drive and efficiency will be lost. Bristol County Agricultural School.

profitable farming is a lifelong undertaking. Some of the best instruction is given after a pupil has been rated a graduate, by the local itinerant agricultural teacher. Records kept follow:

A. **Local triplicate memorandum blanks** are used by the instructors in their weekly or more frequent supervision. Observations made and the instruction given are entered by the instructor, and are receipted for by the person visited. One copy is left with the latter, one copy is placed properly indexed in the school file, and the third copy may be retained by the instructor. If the instructor does not care for a personal file, duplicate, instead of triplicate, blanks are approved. Each blank bears the name of the school or department, and the name of the instructor, his address, and his telephone number. See one of these blanks in Fig. 303 on page 427.

B. **State supervision blanks** are provided by the Board of Education. On these are entered the complete employment responsibilities of the individual pupils for a given year. They are filled out by the local agricultural instructors, are filed with the state supervisor of agricultural education not later than April 15 of each year, and are used by him for recording his impressions of the efficiency of instruction as he inspects the work of the pupils during the growing and harvesting seasons. The front of such a blank is shown on page 453, filled out for a pupil but with the pupil's name omitted.

C. **Advisory committee supervision.** — Advisory committees often feel that their best insight into courses of study, methods of instruction, and qualifications of teachers is gained by accompanying instructors and the agricultural representative of the Board of Education when they inspect the employment of pupils. And it is certain that some of the most valuable service of advisory committee members has grown out of their personal observation of the pupils when engaged in their farming operations.

D. **Deputy commissioner's supervision.** — The deputy commissioner in charge of state-aided vocational education makes an annual inspection of the employment of agricultural pupils, and more frequent inspections of schools or departments selected for special attention from time to time.

**E. Commissioner's supervision.** — Occasionally the Commissioner of Education makes a tour of inspection, choosing schools or departments which, for one reason or another, he desires to give personal attention.

**F. Board of Education's supervision.** — Committee and individual inspections of the employment of pupils by members of the Board of Education can sometimes be counted upon.

(5) **Blanks, files, and photographic supplies,** proposed or approved by the Board of Education for local records of employment, must be furnished by the school or department which desires state aid.

(6) **Employment reports** to the Board of Education, including the earnings of each pupil separately listed, are required annually on November 15. Blanks for these reports are provided by the Board.

FIG. 221. — Ernest Hitchcock feeding "balanced ration" and cost-accounting every cow at home. Graduate of academy who returned part-time for agriculture when Agricultural Department opened. See Fig. 222. Brimfield Agricultural Department.

## 11. Conclusion

There are other requirements and advantages of particular importance to the Board of Education in Massachusetts. Only those which may be suggestive to those responsible for vocational agricultural teaching or supervision elsewhere have been given in this chapter.

Good results have been achieved from the beginning; better and better results, as the years have passed. It is believed that the close of the first ten-year period may safely be punctuated by the statement that the Massachusetts plan of vocational agricultural education

FIG. 222. — Hitchcock cost-accounting, at date of these photographs, every cow on this farm, also, — 16 cows in herd. Owner paid for this work. Owner was progressive — note silo; but for first time knew each cow when Hitchcock gave him figures. Brimfield Agricultural Department.

will justify itself from every reasonable point of view, and will prove to possess undeniable merit as a method of training both for farming as a definite calling and for intelligent and vigorous participation in the community life of any commonwealth.

# CHAPTER VII

## SUGGESTIONS TO SUPERVISORS, SUPERINTENDENTS, AND DIRECTORS, SUPPORTED BY EXPERIENCE IN MASSACHUSETTS

THE author desires to be definite regarding certain principles and procedures which he believes to be important for the sound, and at the same time reasonably rapid, advancement of vocational agricultural education. He therefore ventures the following suggestions to those responsible for administration and instruction in this field, and supports them by certain digests of Massachusetts experience where such principles and procedures have been followed.

FIG. 223. — Russell Skinner, employed by Chairman of Advisory Committee. Substitute for project, cost-accounting entire herd. Owner had pure-bred sire, but had never kept records. Owner a prize winner in clean milk contests. Brimfield Agricultural Department.

### 1. Know the Agricultural Resources and Possibilities of the Locality You Serve

Some sort of survey of the agricultural resources and possibilities of a state or locality should be made as a basis for any well-considered plan for state or local vocational agricultural education.

Before the plan outlined in the foregoing chapters was provided for, the following question was asked and answered: "Does farming in Massachusetts offer sufficiently important and attractive careers to warrant the establishment of a system of agricultural schools in this Commonwealth, to train boys and girls who have reached their fourteenth

birthdays for farm life and work?" Briefly stated, the farming incentives and prospects which were found and the conclusions which were drawn were as follows:

(1) **Incentives to farming in Massachusetts were many.** — In a given farming enterprise there might be blended any two or three, or there might be blended all, of the incentives which made farming in this state attractive.

**A. The stresses and uncertainties of other callings** had led many to engage in farming. Severe competition and uncertainty as to the future in business

FIG. 224. — Owner allowed Skinner land for acre of corn as "home project." Skinner, as "rent," cleared up stumpy section. Prize ears in photo. Took "first" at three fairs. Sold single ears at 25¢ each. Brimfield Agricultural Department.

had resulted in the purchase and development of Massachusetts farm land. Prospects for a profitable investment, a stable occupation, and a lifelong employment at congenial work had been incentives to redirection of effort in such a case.

A section of this state was pointed out, during the survey, which was said to have been bought up, one small holding after another, by "broken-down mechanics." It might be fairly considered one of the least promising sections for farming. The operations undertaken were on a small scale; in no instance on a large one. Health and vigor, and self-sustaining life for their children and themselves, free from the severe competition in the trades and industries, were the primary incentives in these cases.

**B. Family attractions and associations** were strong motives with many. Farm after farm was owned and operated by the same family, in whose ances-

tral line it had remained for eight or even nine generations; and never before had been so capably tilled and productive. The author held in his hand the original parchment deed of the Howe Farm in Marlborough, a farm which had never been deeded since assigned in 1684 to the ancestors of the present owner. The owner was a graduate of the Massachusetts Agricultural College and a member of its Board of Trustees. He was a past master of the Massachusetts State Grange. Coiner of the phrase, " Milk that needs no washing," he was making clean milk and selling it at a profit in a manufacturing town. His oldest son, a graduate of " M. A. C.," was at home and in partnership with him, in dairying, fruit growing, and market gardening. Other such instances included

FIG. 225. — Clifton Scott. Corn project at home. 3 acres. Just seeded to grass at last cultivation. Excellent "catch." Note clean, level cultivation. Cost accounted 5 cows same year. Total farm earnings $598.02. Now in Agricultural College. Ashfield Agricultural Department.

the ancestral farm in West Newbury which is the home of the famous Thurlow Nurseries.

C. **The natural charm of the country** had been a motive for the establishment of the growing number of more or less magnificent estates in Massachusetts. The North Shore, the South Shore, and the Berkshires were noted for the men from the great cities and even from distant states who had sought Massachusetts land for its picturesque actualities and possibilities.

Most of these estates possessed well-rounded agricultural equipment. They had created a large demand for skilled gardeners, florists, fruit growers, herdsmen, grooms, and trainers. They employed expert farm managers, and supplied their own tables with the cleanest milk and the choicest farm, garden, orchard, and greenhouse products. Their stables sheltered harness horse championship winners in international competitions. The owners had paid

the highest prices for the best-bred live-stock, and in notable instances had put their farming operations on a strictly economic basis, as object lessons for neighboring farmers. They were proudest of results of their own breeding.

Beside and among these more splendid estates there was a multitude of simpler establishments, maintained on a more modest scale, for like purposes.

**D. A life pursuit to be found in farming** had been the compelling incentive of many people who had engaged in agriculture. This state had its misfits and failures on farms, as in every other line of human activity; but it also had farmers who loved, and were finding profitable, the careers on the land which they had chosen. The success of the latter appeared to be due to two causes: to a fundamental liking for the land and all the natural accompaniments of its cultivation; and to the economic status and prospects of farming in this Commonwealth, discussed in the following section. The survey yielded abundant and convincing evidence that Massachusetts farmers believed, not only that farming in general offered a desirable career, but also that those who intended to make farming a life pursuit in this state would find themselves put to no serious disadvantage because their lot was to be cast in this Commonwealth.

FIG. 226. — Mr. Ernest Russell, Hadley, left, — first corn club member in Massachusetts to win a free trip to Washington, D. C. Graduate of Massachusetts Agricultural College. Now farming on old homestead and agricultual instructor in Smith School, Northampton. Hadley likes to win. Two from Hadley allowed free trips to Washington in 1918.

Farming in Massachusetts had become increasingly attractive to immigrants who had left the Old World and come here with the determination to succeed. These immigrants were not so much peasants as they were pioneers. They were thrifty and observant; they were quick to adopt new ideas and methods. Money was saved and invested. Theirs was a program of hope. As their savings and their holdings increased in value, their standards of living

had risen; they had begun to educate their children, and presently were on a level with other good citizens in their communities.

(2) **Farming prospects were good**, and were steadily improving. The survey included certain facts and figures with regard to the condition of agriculture in this state.

**A. The Agricultural Census of Massachusetts** for 1905 reported the value of property devoted to agriculture in general in this state as $288,153,000.

THE SPRINGFIELD UNION: MONDAY EVENING, NOVEMBER 23, 1914

HAMPDEN CO. IMPROVEMENT DEPT.

KEEP RECORDS OF HERDS FOR YEAR

Young Men at Brimfield Vocational School Give Instructive Report.

YIELD OF EACH COW

Results of Changing Feeding Ration Also Shown.

FIG. 227. — Three Brimfield boys, Norcross, Hitchcock, and Skinner, reported records, cost, and comparative profits on cows in four herds for a year at a meeting attended by forty farmers. Explained methods and answered questions for two hours. Superintendent of schools said exercise would have been creditable "in a seminar course in Columbia University." Both sides of these blackboards were used for records and comparisons. See next page. Newspapers reported the meeting.

The annual farming output was valued at $73,110,000. Comparisons were made. It was found that, while the value of the manufacturing output of the state was fifteen times as great as that of the agricultural output, the total value of property devoted to manufacturing was only about three times as great as the total value of that devoted to agriculture. Such comparisons were a spur towards efforts to secure for agriculture more nearly equal returns per unit of investment in the general field of vocational efficiency. But considering agriculture by itself, there was positive evidence of advancement which was encouraging. Its growth in importance was shown by the fact

FIG. 228. — This young farmer, owner of Holstein herd headed by "Briar Parthenia Korndyke de Kol" (1 yr. and 10 mo.), was not present at the meeting mentioned in Fig. 227, saw the report and telephoned to ask if adult farmers could not be given similar instruction. A class was formed. Before end of year, more than 400 cows on individual test, where before the department opened not one cow was on test. Norcross may be seen above in *Frontispiece*, Hitchcock and Skinner in Figures 221, 223, and 224. Brimfield Agricultural Department.

that in 1875 the total value of output was $37,073,000; in 1885, $47,756,000; in 1895, $52,880,000; and in 1905, $73,110,000.

**B. Massachusetts farmers said farming prospects were promising.** Most of the conferences were personal interviews with Massachusetts farmers on their own premises, — farmers who were regarded by their communities as thoroughly reliable, and who were dependent on their farming for a living. In all sections of the state the prevailing opinion was that no state offered a better opportunity for profitable agriculture and a satisfactory home life on the

farm than did Massachusetts. This was shown by statements such as the following:

" We have good land." " We have the best markets in the world." " We have good roads and short hauls." " We have excellent shipping facilities, and the cost of shipment is light when compared with the cost of shipping produce from distant points." " I increase my market garden production a little every year; the more I produce, the more I can sell."

FIG. 229. — Bicycles help in supervision. Mr. Botsford at Petersham.

" The cities are growing so much faster than the rate of increase of production from the land, that excessive competition is not to be feared, and prices for prime farm products are bound to continue good and are likely to become better." " The great variety of soils and products is favorable to satisfactory farming, taking one year with another, in this state." " A keen eye to the markets, and shipment to New York or other out-of-the-state points, when prices rule low here and high there, take care of any temporary surplus or slump in home market prices." " For choice fruit there are almost unbelievable possibilities in the home market, with the port of Boston ready for shipment of practically unlimited quantities, especially of apples, to foreign markets."

" We have good libraries, public schools, and churches." " The Grange in Massachusetts is a splendid organization for getting the farmers together for pleasure and the improvement of their life and work."

Such were the things said by the farmers themselves of the advantages of farming in this state.

**C. Few abandoned farms** showed farming prospects to be improving. Secretary Ellsworth of the State Board of Agriculture had in press a report of 160 pages, entitled " Massachusetts, her Agricultural Resources, Advantages and Opportunities, with a List of Farms for Sale."

In his preface Secretary Ellsworth said that his publication was " issued

at the beginning of an exceptional era in Massachusetts agriculture." He then added, " While an effort was made to secure the names of parties owning or controlling strictly abandoned farms, the attempt was ineffectual, and we are forced to confess that in our belief there are few such farms in the state. Nevertheless, reports confirm the opinion that there is an enormous amount of land lying idle or partly deserted, and that many farms are not worked to anywhere near their limit."

**D. Improved tillage** had made farming prospects better. Massachusetts land was remarkably responsive to better farming. Land once tilled but then lying for the moment largely or even entirely neglected was regarded as a sign-post of dormant fertility. Such land was simply resting. Striking examples of this fact came to view during the survey. One instance may suffice for illustration, and the fact that this is furnished by the work of a woman whose farm was visited renders it none the less significant.

The owner of an intensively tilled farm, with a model dairy and well-developed piggery, poultry, market-garden, and greenhouse departments,

FIG. 230. — Horses are necessary at some seasons on mountain roads. Mr. Sussmann at Ashfield.

desired to increase her output. She therefore bought a 20-acre field. This lay next adjoining her own improved land, but had not been cropped within the memory of the oldest inhabitant of that section, — not for at least sixty years, and probably not for more than a century. It was sparsely strewn with wild grass, gray moss, sweet fern, and bayberry. The former owner had often said that he would keep a yoke of oxen, if he only thought he could grow enough feed for them, but he did not believe he could do it.

The summer of the survey, its first season in tillage at the hands of its new owner, this field yielded 10 acres of rye, straw, and grain; 250 bushels of splendid potatoes; 80 tons of ensilage, put in the silo; 2 acres of heavy field corn, at the time of the interview standing in the shocks; and 2 tons of sugar

pumpkins; while at the time the field was visited there were 8 acres in clover, sown in the rye and showing a good "catch," ½ acre in turnips, with the remainder of the field laid down to rye again.

**E. Increase of investments** in land showed that farming was becoming more attractive as a business enterprise. Keen business sagacity had led a caterer well known in the state to purchase a farm and develop it as an adjunct to his city business. His farm was a strictly financial proposition. Though model equipment and conditions had been established, he did not use it for a summer residence, and his visits to the farm were for inspection and for conference with his manager. Strict accounts were kept. Waste from the catering kitchens was sold to the piggery department. Poultry, market-garden, piggery, fruit and dairy products were sold to the catering ends of the combined business. The books showed that the farm was a paying investment.

FIG. 231. — Motor cycles are handy on improved roads. Mr. Bronson at Marlborough.

"Golden New England," by Mr. Sylvester Baxter (*The Outlook*, Sept. 24, 1910, pages 189–190), was an account of the status and prospects of farming in this section. Mr. Baxter gave the following somewhat striking instance:

"On a certain Essex County place a Boston business man has gone into apples in a way that ranks the undertaking as a great business enterprise. A single place, with something like 50,000 apple trees, not only cuts a large figure in Massachusetts, — even in the great West it would mean 'going some.'"

**F. Little farms, with intensive farming, yielded large returns.** — Contrasted with the western prairies, the smaller fields along and among the hills and streams of Massachusetts had seemed to some impossible of profitable cultivation. By them it had even been asserted that Massachusetts is " not an agricultural state." Such a remark was met by the Massachusetts farmer with a blank look of amazement. He had no doubt that farming in this state was a permanent and would be an increasingly important vocation. He knew that fundamental to advancing agriculture is a market commensurate with its

FIG. 232. — Most of the instructors use automobiles. Light touring cars are preferred, because pupils, equipment, and supplies can on occasion be so readily carried. Home-project efficiency depends upon supervision, regular and frequent. Mr. Powers at North Easton.

output; and he saw the manufacturing towns in his neighborhood growing with a rapidity almost beyond belief.

Even in the West, not the enormous holding, but the smaller one is now recognized as the more promising basis for the most permanent and profitable agricultural production. Evidence is abundant that the little farm may yield large returns. One of the tidiest bits of farming seen during the survey was on a 10-acre farm, of which part was in pasture and only about 6 acres were under cultivation. Some of the land was tilted on edge, in typical New England fashion. All of the fields were more or less irregular in their boundaries, and from some of them cartloads of stones had been removed, with more to follow. The land was " kept busy." Market gardening was the main feature, but there

was fruit; and there were " side lines " of dairying and poultry, to utilize "clippings " and unsalable remnants of the principal products. This farm was yielding a profit of $5000 a year.

Other farms visited, which to the unaccustomed eye might look small, were yielding net returns of from $2000 to $10,000, and even $25,000 a year. Greater thrift and satisfaction in work well done one could not hope to find in any state.

FIG. 233. — Mr. Doolittle at wheel. His advisory committee said he was such a valuable adviser that they desired "more of his time to be spent on farms and less between farms." He had been using a bicycle. A fund was subscribed and this car given his department. The second year, 36 pupils applied, too many for one instructor. Assistant at left was provided. Photograph taken on farm of a Concord pupil in 1914. Mr. Doolittle is still at Concord. His work never was so good as now, and he is still growing.

Mr. Baxter, in the article above cited, gave the following instances:

" A half-acre strawberry patch, . . . yields 5000 quarts, worth $525. Eleven hundred dollars have come from an acre and a half of cantaloupes. There are thousands of acres in asparagus in Massachusetts alone, with profits of $300 or even $600 an acre. An Italian makes from $4000 to $5000 a year off of 4 acres in market gardening. Five acres in peaches have yielded $2500 in one year. Apples! That is a story in itself. And flowers? Well, there is a lady

on Cape Cod who makes $200 or so every summer on a patch of sweet peas little bigger than a city back yard. As for potatoes and corn, there are numerous big records."

**G. Productivity compares favorably with that of other big farming states.** — Secretary Ellsworth, in the pamphlet before mentioned, was outspoken and explicit in his estimate of the agricultural prospects of Massachusetts. This

FIG. 234. — Farmers are invited to help. Rear seat, three of advisory committee of fifteen farmers. Woman's farmhouse in background. She has been a successful dairy farmer for years on old homestead. Agricultural instructor at left on front seat. State supervisor at wheel. Home projects of 16 pupils visited in an afternoon, with full opportunity to stop at quiet spots on road and talk over what has just been seen or what is about to be seen. Instructors thus learn from farmers, and farmers from instructors. Photograph taken at Brimfield for Panama Pacific Exposition.

has previously been intimated, and will more clearly appear from the following passage:

". . . when ratio of aggregate production to aggregate acreage, yield per acre of certain crops and character of tillage are considered, Massachusetts ranks favorably with the leading agricultural states. The following data, gleaned from the latest official statistics, add strength to this statement:

"In 1900 Massachusetts had 3,147,064 acres in farms, which yielded the previous year $42,298,274 worth of farm products. As compared with the five leading agricultural states, we find California, with nine times this number

of acres in farms, producing only three times as many dollars' worth of farm products; Illinois, with ten times the farm acreage, producing eight times as many dollars' worth of farm products; Iowa, with eleven times the farm acreage, producing nine times as many dollars' worth of farm products; Kansas, with thirteen times the farm acreage, producing four and one-half times as many dollars' worth of farm products; and Texas, with forty times the farm acreage, producing five times as many dollars' worth of farm products."

(3) **Conclusions.** — It was believed, in short, that the experience of those who were successfully engaged in farming here, and the economic status and prospects of farming in this Commonwealth, showed conclusively that exceptional success awaited the work of the exceptional man or woman in this field of economic activity; and that farming was bound to afford a profitable and satisfactory living for the average boy or girl who entered this field with a thrifty, alert, and progressive spirit, and with a proper preliminary education.

At the beginning of the survey, the question was raised as to whether a system of agricultural schools would be likely to result in increased valuation of taxable property on farms, and thus return directly to the public treasury at least some portion of its cost. One farmer put the gist of the answers of all his fellows into the succinct reply, that it did not take the assessors long to discover any improvements that he made on his farm as a result of better methods.

Finally, it appeared that farming in Massachusetts was a calling the successful pursuit of which required knowledge of the sciences that lie back of the practice of agriculture; that, in order to secure a more widespread, productive, and profitable agriculture, it was necessary that vocational schools and departments supported and controlled by the public should train boys, and now and then a girl, in the best methods of farming; and that farming in Massachusetts was a calling of sufficient importance to justify both local and state support of a system of vocational agricultural education such as that set forth in the foregoing pages.

(4) **Present status.** — Findings of one date should be checked up by findings of later surveys. The present Commissioner of Agriculture has reviewed the original findings above outlined and has approved them as fairly representing the agriculture of Massachusetts to-day. All of the conditions then favorable are still favorable.

The old New England academy has been called the most efficient device ever contrived for depleting New England country life of its best blood and brain and moral fiber. The old New England minister used to glory in the boy he had helped to send away. Everything

was done that could be done for the boy who was to go, that might directly help him to succeed in his chosen career. Little or nothing was done for the boys who were to stay at home that might help them to succeed in their chosen careers. A radical correction of these faults is now on foot.

Knowing the agriculture and the education of Massachusetts, a plan of vocational agricultural education has been established which affords a choice between separate or county school training and that of the high school department. The high school department plan is particularly significant. Due to its very modest cost, it may enable every old rural academy and every new rural high school to serve, not only the distant community, but also the community in which it sits. One does not cease to be an optimist by reflecting that of the ten thousand boy babies born a year in farmhouses among the hills, under the trees and by the streams of New England, it is given to few to become great, but it may be given to all to become sound and serviceable. Sound and serviceable for farming and country life more and more Massachusetts boys are becoming under the home-project plan of vocational agricultural education.

### 2. Fit Agricultural Instruction to Local Needs

Local needs ought to be surveyed and re-surveyed continually.

In Massachusetts there have been found to be several outstanding needs.

(1) **Needs of sons of well-to-do farmers.** — Sons of prosperous farmers desire this education. By prosperous farmers are meant those who have large capital and are farming on a big scale, whether by intensive or extensive methods. Such farmers, or their foremen, will probably continue to be the best possible instructors of their sons in details of skill in practical operations; and their home farms will provide abundant opportunity for the practical or productive school work of their sons.

The chief need of the sons of prosperous farmers is training in certain elements of agricultural science. Those elements should be selected which directly bear upon the home farm operations which the pupil is observing, or in which he is participating. Such a boy

should master a body of scientific facts and principles that will forever free his farming from the rule-of-thumb by bringing it under the rule-of-reason. Few prosperous farmers can fully instruct their sons in

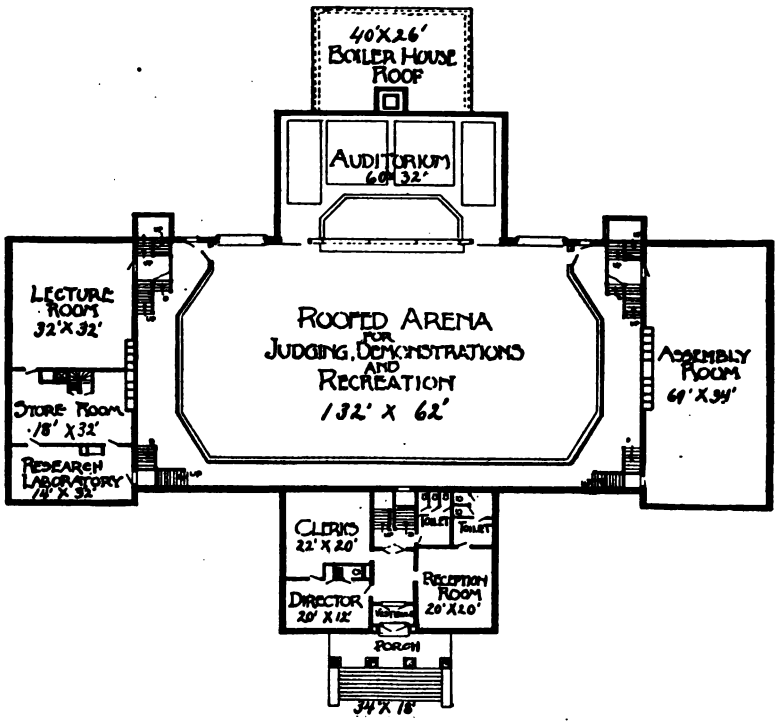



FIG. 235. — Building designed to meet the distinctive needs of an agricultural school. Roofed arena, a mammoth corridor. Stairs in corners. Entire floor space in end sections thus free for class uses. End walls of arena cost no more than if corridor had been only ten feet wide. Four buildings, or five, under one roof. Marvel of low cost for construction per unit of space and convenience. Design sketched by the author. See Fig. 307 for front. Smith School, Northampton.

these matters, — they are without laboratory equipment, they are too busy, and in most cases they are frank to say that they have not the necessary scientific knowledge.

It is evident that vocational agricultural education may render a real service to those sons of prosperous farmers who will not take the

longer course of four years in high school and four years in an agricultural college, but who desire a shorter course of from one to four years in the scientific aspects of their practical farming. For such boys there can hardly be too much attention given to the kind and quality of scientific training; always, of course, remembering that the training must be suited to the age and capacity of the boys.

(2) **Needs of sons of parents without land or live-stock.** — There are boys from village and city homes who desire to take up farming. Such boys come with scarcely any farm experience, and are generally destitute of land and live-stock.

The chief need of boys from homes which have neither land nor live-stock is adequate facilities at the separate or county school for productive farm work, or employment throughout the year on farms near the high school departments they attend. For such boys, stronger stress should be put not upon the scientific equipment at a county school, but upon its equipment for practical farming. And their needs for training in practical farming may be satisfied best by practical work of two sorts:

**A. Training for wage-earning.** — These boys must learn to take orders. They must show capacity to master the "knack" of doing the thousand and one things in routine farm work which require skill; and such capacity can only be shown by doing things as they are told or shown how to do them, by doing them repeatedly, by doing some of them regularly and promptly, and by doing them at last better, if possible, than any competitor for a given job on a farm could do them.

To meet the needs of such boys, the number of boys admitted should be small and the school should be conducting practical operations on a large scale. Or the school, like the high school department, should find jobs for these boys on prosperous farms, where they might work with the privilege of attending the school, and where they might master the practical elements of their proposed occupation, while mastering at the school its scientific elements.

**B. Training for independent farming.** — For the competent training of these boys, a year or two of wage-earning training should be supplemented by a year or two of experience in planning and carrying

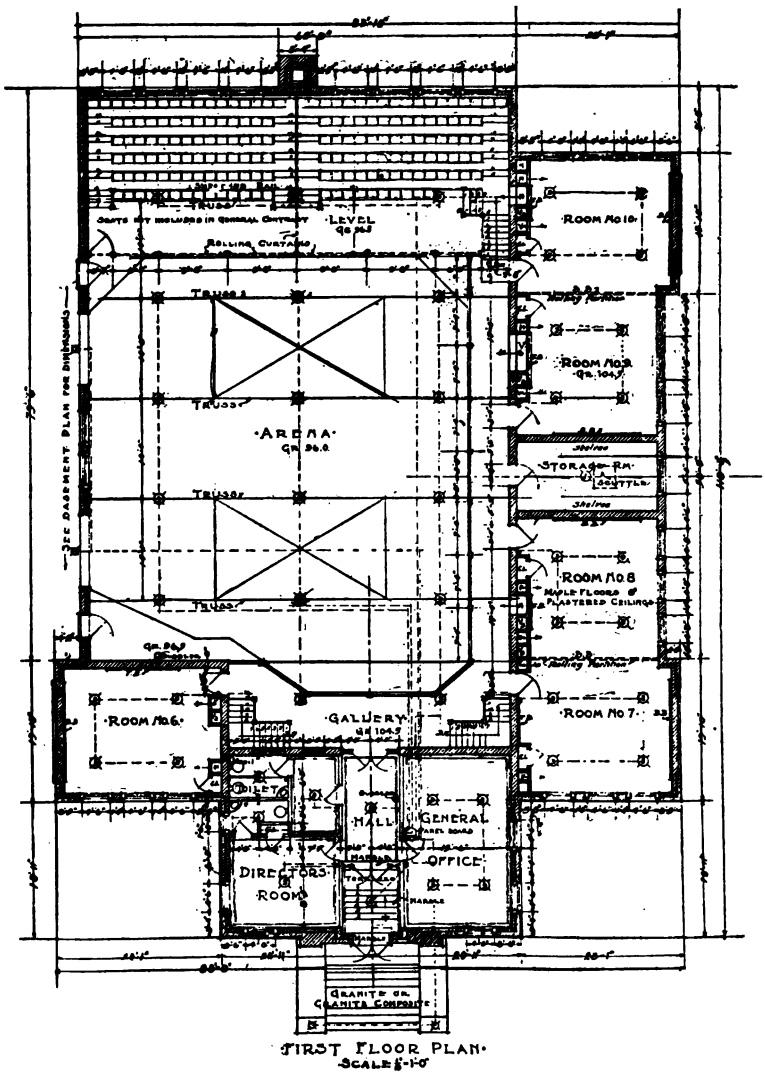



FIG. 236. — Smaller building, arena type. Design sketched by the author. Architect, Mr. Wm. Chapman of Boston.

out productive farm projects. Science and practice should everywhere go hand in hand; but, to good illustrative operations conducted by a separate or county school and adequate land and live-stock therefor, should be added enough land and live-stock to enable these boys to conduct sizable enterprises in which they would meet all charges and from which they would receive all of the profit.

The live-stock bought for such purposes should be the best the resources of the school permit, and the land bought should be the

FIG. 236, *Continued.* — Main building at Norfolk County Agricultural School, Walpole. Brick and stone. Colonial front. Arena with clay floor, and with driving entrance and exit. Arena fence, like that of Smith School, convertible into table space. Two floors including high, light basement rooms for purposes of instruction and administration. Offices, front; auditorium, rear. No long corridors. Stairs in corners of arena.

most highly productive and easily tilled that can be obtained. Such boys should be shown the possibilities of farming at its best, and allowed to have profits equal to the best any farmer could hope to gain after all proper charges had been met.

These boys need, during the trying years from fourteen to eighteen, to be held to a steady course, to be given both skill and intelligence in farm work and management. But above all, perhaps, they should be given courage, the courage of their own convictions, based on their practical farm experience, that farming is a calling which is attractive and which can be made to pay. Poor live-stock and land at the

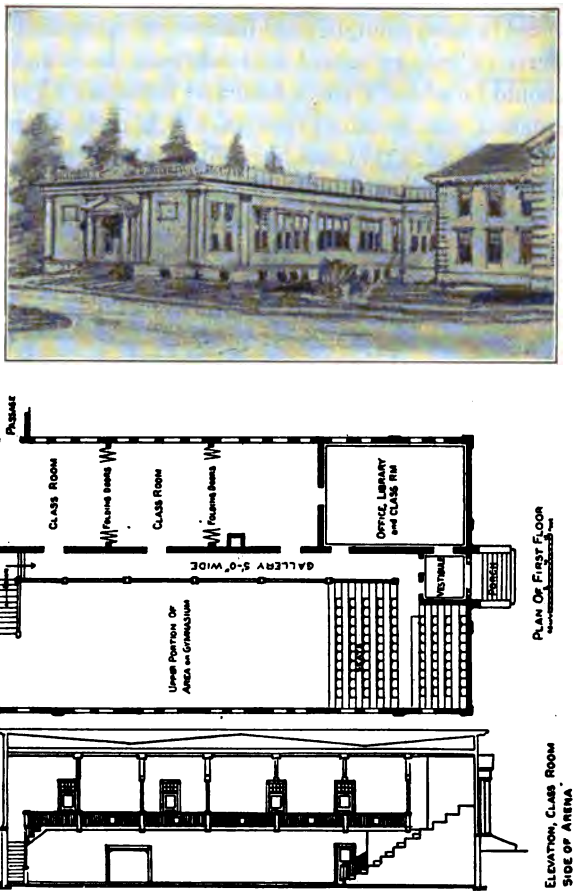



FIG. 237. — Proposed addition to accommodate home-making course on first floor, and agricultural department in basement and arena. Bottom drawing shows terraced floor at right, stairway in corner, wide entrance into shop at left and at right door into agricultural classroom and laboratory. Upper panel shows terraced seating of arena, office, and classrooms. Note folding partitions between rooms to provide for exhibits and other public functions. Arena has driving entrance at left, and is large enough for sizable basket-ball court. Estimated cost, less than $10,000. Detailed drawings by E. C. & G. C. Gardner of Springfield, Architects of the Smith School at Northampton. Design sketched by the author. Brimfield Agricultural Department.

school might defeat its purpose in the cases of these boys by discouraging them, and by forcing them to form unfair opinions as to the best possibilities of farming open to a man of spirit, proper training, and reasonable capital.

(3) **Needs of sons of farmers of modest means.** — Most of the boys, however, who seek vocational agricultural training are likely to be sons of farmers of modest means. There are many farmers who are just getting, or trying to get, a start. Some have land that needs extensive improvement. Some are without all the equipment they might well desire. But all have something with which to begin. If their sons seek training at a separate or county school, they should find there the best inspiration which good land and live-stock, good general farm equipment, and good profits can be made to give.

Individual farming enterprises at the school, in the cases of these boys, should be omitted or should be secondary. Of primary importance should be such enterprises carefully studied and competently carried out at their own homes, under regular school supervision. If the school failed in all other cases, it should not fail here. In fact, due attention to the requirements of such boys may well prove to be one of the most important helps to a separate or county school in keeping a just balance.

Exclusive regard for the sons of prosperous farmers might lead the school to omit land and live-stock, and to put its funds into library and laboratory facilities for the training of these boys in agricultural science. Or, exclusive regard for the sons of parents who have neither land nor live-stock might lead the school to lessen library and laboratory facilities, and to put undue emphasis upon productive operations as means of training these pupils in practical farm work. Whereas, the sons of farmers of modest means need, and should be given, all the inspiration and courage good farm land, equipment, operations, and profits at a school can give, — coupled with such a mastery of the elements of agricultural science as will make plain to their understanding what they are doing at home, towards realizing some of the best results which they have found elsewhere.

If these boys attend a high school agricultural department, every effort should be made, by visits to, or by temporary employment on,

the best farms in the locality, to enlighten them as to the possibilities of progressive farming and to spur them to the best effort of which they are capable.

(4) **Needs of those over sixteen who desire evening or other short courses.** — The requirement, in the Smith-Hughes Act, of six months of supervised farm practice in connection with all federal-aided vocational agricultural education is most salutary. The educational cycle

FIG. 238. — Auditorium an agricultural classroom. Blackboard. Partition rear of instructor lifts. Events in arena thus brought into view. Live-stock demonstrated in either auditorium or arena. Smith School, Northampton.

in all agricultural schools and departments should be completed. The instructor needs to know the home conditions of his pupils before he tries to teach, in order that he may know exactly what to teach. Projects, conducted by pupils of whatever age, in short course or long, for which teaching materials are prepared, should begin and end the cycle of vocational agricultural education.

(5) **Needs of families for itinerant teaching.** — Those responsible for vocational agricultural education ought to meet the needs of suburban and village residents who have, or can be helped to secure, land

or live-stock and who desire to make their agricultural holdings contribute to their support. Such needs, important at any time, are peculiarly pressing under the present conditions of food shortage and oppressive prices.

**A. Example of a survey of such needs.** — In Massachusetts in 1913 a special survey of the needs and possibilities of agricultural teaching was made, in response to an order from the legislature that

FIG. 239. — Sliding partition lifted. Auditorium floor has sewer connection. Arena floor is clay, with surface lightly sanded to prevent sticking and tracking. Sprinkled five P.M. No dust during day. Scoring and demonstrating live-stock. Smith School, Northampton.

the Board of Education investigate and report upon the needs of city families for agricultural instruction.

Newspaper dispatches had announced that the Chicago evening schools were to provide agricultural instruction for foreign residents during the winter of 1913–14, and that the New York State School of Agriculture, on Long Island, was being established at an anticipated cost of a million or more dollars for the express benefit of city boys, who were later to be provided with small farms on easy terms by a group of philanthropists. A valuable experiment was found in the plan of the late Mr. Austin C. Dunham of Hartford, Conn., who had

bought a ninety-acre tract of land, and had it laid out in small parcels varying in size from one to five acres. On each he was proceeding to build a comfortable house, a cow shed, a henhouse, and a pigpen. He proposed to put each tract in a high state of cultivation, to stock it, and to deliver it to a selected family at the actual cost, charging 4 per cent interest for the amount not paid. He proposed that the wife and children should " take care of the hens, milk the cow, and feed the pig," and the husband should " continue to work for wages, and in his overtime take care of the garden," a practice which he said he found

FIG. 240. — Portable colony houses for poultry made here. Bad weather does not stop work. Horse shows held in arena. Note sloping fence. Wheel hub cannot catch. Rider cannot be crushed against post. Fence, combination fence and table. See Fig. 242. Smith School, Northampton.

already in vogue. Provision for the agricultural instruction necessary to insure successful productive operations was to be made. Already Mr. Dunham had had 120 applications for one of these " farms," some of them evidently being of such a character as would warrant their being accepted. Such indications as these, while establishing, perhaps, a reasonable presumption of need, were not regarded as well-proved precedents.

More valuable and suggestive had been the experience which the Board of Education itself had had in supervising the expenditure of state funds in aid of vocational agricultural education. Repeatedly boys, a number of them of foreign parentage, from families owning or occupying small suburban places,

had sought admission to agricultural classes and had greatly profited from the instruction. The interest, thrift, and intelligence shown by parents in connection with the productive farm work of the pupils, which had been supervised during the summer by the agricultural instructors, augured well for the extension of this sort of instruction and for the feasibility of adapting it to the needs of the younger children and of the parents themselves.

**(A) The plan and details of the survey.** — Under the terms of the House order, passed by the legislature May 6, 1913, the Board of Education felt that

FIG. 241. — Auditorium seats steeply banked. "Not a poor seat in the house." Arena for work, exhibitions, and recreation. Driving entrance at left, exit at right. Winter tennis, basket ball, etc. Smith School, Northampton.

it was incumbent upon it to obtain data as to the need and desirability of agricultural instruction on the part of families living in congested quarters of cities. No funds were provided wherewith the Board could undertake an extensive investigation. It was decided, therefore, to obtain facts regarding 500 typical tenement families in the North End and West End of Boston.[1] For this pur-

[1] The author consulted the secretary and other representatives of the Homestead Commission. Mr. Philip Davis, of the North End Civic House, rendered valuable assistance in selecting so-called "linguists," — persons familiar with the various foreign languages spoken by the heads of families in the North End and West End, — to hold the necessary personal interviews and obtain the required data. The Boston school committee furnished, through schoolmasters, lists of the heads of families with children of the ages above specified. Special mention should be made of the faithful and untiring labors of Mr. Francesco Profita, since

pose " linguists " were employed as canvassers. These canvassers were carefully instructed regarding the general objects of the inquiry. It was necessary to put before the heads of the families consulted a clear-cut and concrete plan. A memorandum for the information of the canvassers was prepared for this purpose. It was assumed for convenience that the city of Boston, having been given authority to do so, would proceed to establish and maintain a vocational agricultural school. It was assumed that a portion of the fifty-acre tract which the city was authorized to purchase for this school might be used

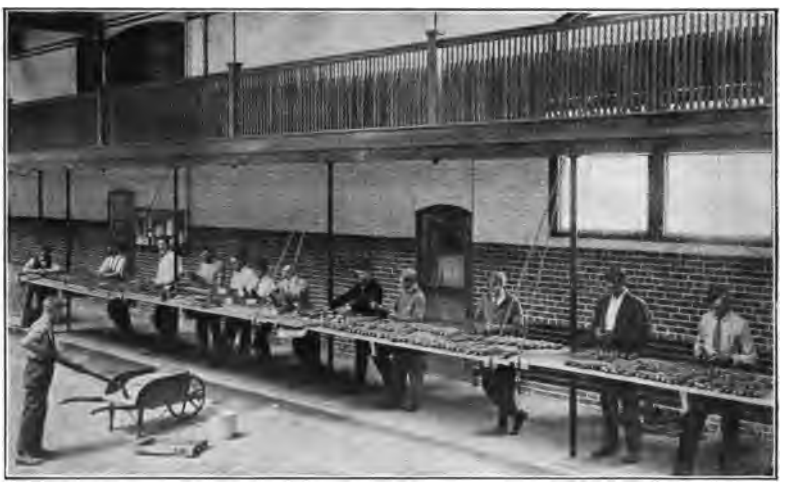


FIG. 242. — Arena fence converted into table. Pipe bearing at top. Bottom lifted. Light chains support table at outer edge. Table space at moment's notice with no trouble from cartage, breakage, or storage. Note gallery above, which serves for thoroughfare at intermediate level of building, also for seating at shows and other big events in arena. Designed by the author. Smith School, Northampton.

for small homesteads to be rented as a sort of cottage and garden laboratory system in testing the demand for, and the practicability of, the teaching of agriculture to families from tenements. It was further assumed that wage-earning would go on as usual. Finally, it was assumed that the chief purpose of the school, even while teaching agriculture to a few such families, would be the preparation of pupils over fourteen years of age for " wage-earning or other productive work on the farm," — the usual work of agricultural schools. These four assumptions were clearly in the minds of the interpreters as they presented to heads of families the outlines of the plan.

he was the interpreter through whom the plan suggested for consideration was brought to the attention of by far the greatest number of individual families.

Five hundred families, accordingly, were approached by the interpreters, some more than once, with the following results:

**a. Replies refused.** — Some refused to be interviewed. Doors were opened but a crack and then slammed in the faces of the interpreters. In a case now and then, before scarcely a word had been spoken, the interpreter was jostled, and heavier violence was threatened. Such opposition had no significance so far as the possible merits of the plan were concerned. A stranger was at the door, and as such was viewed with violent suspicion.

**b. Replies given but names withheld.** — Others were willing to listen to a full explanation of the proposed plan. They were even willing to answer the questions of the interpreters. But they were not willing to give their names. They were not opposed to the plan, but were suspicious of the interpreter, and would not risk a formal indorsement. Evidently more than one foreign-speaking tenement family has been victimized by the house-to-house canvasser. No account, beyond a record like that here given, was made of the replies of such heads of families.

**c. Some opposed.** — Still others discussed the plan in all of its bearings, but were opposed to it. Some said they were happy where they were. They had many friends living near them. They liked to take a stroll in the crowded streets and by the store windows. They were close to their places of employment, and were not under daily expense for car fares. Amusements were near and cheap. There were odd jobs for the children from which their earnings were considerable. The schools were good enough for them and were close at hand. Some were taking boarders or lodgers and thus were able to tide over, with a degree of comfort, dull seasons when the head of the family was out of work. Other than a record like that here given, no account of the replies from such families was made.

**d. Thirty-seven per cent favorable.** — One hundred and eighty-five families favored the plan, answered practically every question, and either signed or gave their names. In these families there were 958 children, ranging in age from one month to thirty years.

Of the boys, 193 were over eight and under fourteen years of age. Of the girls, 154 were over eight and under fourteen. Of those fourteen to eighteen years of age there were 88 boys and 71 girls, or a total of 159.

One hundred and sixty-six heads of families desired agricultural instruction for themselves; 164, for their wives; 168, for their children. In these families the number of children living at home was 896. Of these children the number then earning was 248.

The occupations of the heads of families, and the number in each, were as follows: attendant, 1; bakers, 3; barbers, 5; bed-makers, 2; blacksmith, 1; butchers, 3; candy-makers, 4; carpenters, 6; cook, 1; firemen, 3; florist, 1; foremen of laborers, 3; freight house worker, 1; glazier, 1; grocer, 1; hod carrier, 1; jeweler, 1; laborers, 94; maker of flavoring extracts, 1; market

man, 1; masons, 2; musician, 1; packer, 1; painters, 3; peddlers, 14; piano tuner and repairer, 1; porter, 1; pressers, 5; ragmen, 2; seaman, 1; shoemakers, 4; stonecutters, 3; stone polisher, 1; storekeeper, 1; tailors, 8; teamsters, 3.

The places of employment of the heads of these families, except those in or near the center of Boston, and the number of each, were as follows: Cambridge, 3; Somerville, 2; Everett, 1; Cottage Farm, 1; Mattapan, 2; Concord, 1; East Dedham, 1; Brockton, 1; Clinton, 1; New York, 1.

Thirty-three were voters. Twenty-one had taken out their first papers for the purpose of becoming voters.

Birthplaces, with the number from each, were given as follows: Italy, 151; Russia, 30; Austria-Hungary, 2; England, 1; New Jersey, 1.

FIG. 243. — Annual poultry show in arena. Held under joint auspices of School and County Poultry Association. Various courses are similarly brought to climax in events which bring best pupils can do into comparison with best products of adults. 1000 birds shown. Uniform, sanitary, steel coops. Smith School, Northampton.

The commonest rent paid among these families was $12 a month; the lowest rent paid was $7 a month; the highest, $29; the average, $12.14. The commonest number of rooms per tenement was 3.

Thirty-nine said they had lived in a suburb; 141 said they had not.

One hundred and eighty said they would prefer not to remain in a city tenement.

**(B) Replies intelligent.** The number of the questions asked and the nature of the information requested were intended to be such as to insure deliberate and intelligent replies. The considerations which appeared to have carried most weight were three:

**a. Thrift a motive.** — Financial betterment was anticipated. Many saw in the plan a means of reducing their cost of living. Seventeen even went so far as to urge that an opportunity be given them to secure, on an easy-payment

plan, homes for themselves with a little tillable land about them. They held that their agricultural instruction would be much enhanced in value, if their directed labor could be spent upon land which was ultimately to be their own.

**b. Child welfare a motive.** — The weightiest consideration with many was the welfare of their children. Their present living conditions were bad enough for adults; for children they said these conditions were woeful in the extreme. To them the brightest promise of the plan suggested was found in the wholesome living conditions and opportunities for fruitful labor proposed for their young. They accepted without hesitation the view of Mr. Henry Sterling,

FIG. 244. — Waiting in auditorium for lecture and demonstration by expert at poultry show. Partition will be dropped, thus shutting out all arena confusion. Smith School, Northampton.

Secretary of the Homestead Commission, that " the benefits of a few years of such an environment and training to children from the crowded tenements are too great to be told."

**c. Suburban residence a factor.** — While 147 had worked on a farm or garden, and therefore were in position to judge intelligently of the work involved in the suggested plan of agricultural instruction, the plan might not have been favored had it not been provided that the place of residence should not be more than a 5-cent car ride from the Boston city hall; that is to say, the plan was dealt with as a strictly suburban proposition.

**(C) Replies significant.** — Of the 500 families approached, 37 per cent were favorable to the plan suggested. Advocates of agricultural instruction for city tenement families had expressed the opinion at the beginning of this investiga-

tion that if even 5 per cent were found to be favorable, the proposed plan would merit a trial.

Moreover, the secretary of the Homestead Commission was of the opinion that his commission would be able to satisfy the desire of those who preferred easy terms upon which to become owners, rather than renters, of small homesteads. He was confident that once a family had proved itself to be honest and reliable, amenable to reasonable rules of occupation, apt at profitable production of fruit, vegetables, poultry and eggs, milk or honey, and could show

FIG. 245. — Morning before show. Nervous horses being schooled to arena. Eighty-six horses shown in sixteen classes, afternoon and evening. Stabled in tent at rear. Saddlers, drivers, drafters, expressers, farm chunks, children's ponies shown. More than 1000 spectators. Ribbons to the winners. Winners paraded and fine points indicated by announcer. Smith School, Northampton.

a certificate from the director of the school, or from the agricultural instructor by whom it had been taught, to this effect, people of means could be induced by his commission to provide the desired opportunity for the purchase of a homestead. Suburban homesteads, he thought, should be ready for purchase on easy terms as fast as families could be prepared to operate them reliably and profitably. If his ground was well taken, this possibility gives an added touch of interest and significance to the above impressive figures.

(D) **Conclusions.** — It was evident from the information gathered regarding tenement families that the methods by which such families can be successfully taught agriculture must differ radically from those which are suitable in

a " movable school " or winter " short course " for adult farmers, and that they must differ somewhat from those which are followed in " day classes " for vocational agricultural pupils.

Adult American farmers bring to the lecture room a rich background of practical experience, and often are capable of making written notes of facts and principles for later review, adaptation, and application; and day school pupils over fourteen years old are capable of reading, studying, and note-taking. The conditions in these foreign-born families are such that the adults, so far as they have any background of agricultural experience, have only knowledge of foreign soils, climates, and crops; the available American agricultural literature is in a language which they read with extreme difficulty or not at all; often they cannot write; while the children under fourteen have no agricultural background at all and need guidance day by day, or at least week by week, in productive work as the first step in their agricultural instruction.

Methods of " telling and showing," in connection with the various phases of agricultural production proposed, therefore, would have to be developed and applied; and it was thought that these undoubtedly would better be attempted at first on a small scale, so that their efficiency could be carefully studied and thoroughly proved. Following methods of telling and showing, at the time and on the field of action, parents and children might be led to aid and supplement one another's endeavors, — the children, on one hand, acting as interpreters for the instructors in the efforts of the instructors to inculcate certain fundamental but very elementary agricultural facts and principles; the parents, on the other hand, between visits of the instructors, guiding and steadying the routine agricultural work of the children.

The men selected for the vocational agricultural instructorships, it was believed, would know best how to adapt their present methods of telling and showing to the needs of these families. The field would not be wholly strange to them. Already they were teaching the fourteen-year-old pupil and supervising his home projects in agricultural production, and it was apparent to all intimately connected with their work that the differences in learning capacity between pupils who had reached their fourteenth birthday and those who had not did not hinge upon that birthday, but were largely matters of heredity and opportunity. Since the agricultural teaching above suggested would be given either at twilight, when the parents were at home, or in other out-of-school hours, it was thought choice of methods should be governed solely by the learning capacity of the applicants as embodied in the complementary abilities of the parents and of their children eight to thirteen years of age.

The proposal that the school itself should possess sufficient land to provide small homesteads for families during the period of instruction was novel, and there was no available experience on which to judge of its merits. The Board recommended that as an experimental measure existing agricultural schools should be enabled, under proper supervision of the Board, to provide

on land already owned by them small homesteads, not to exceed two in the case of any school, for carefully selected families. The experiment seemed to be well worth making. If an agricultural school were established in Boston with fifty acres of land, two homesteads of this character could readily be made available, and in a few years the possibilities of agricultural instruction for families by aid of such homesteads could be demonstrated. If the experiment

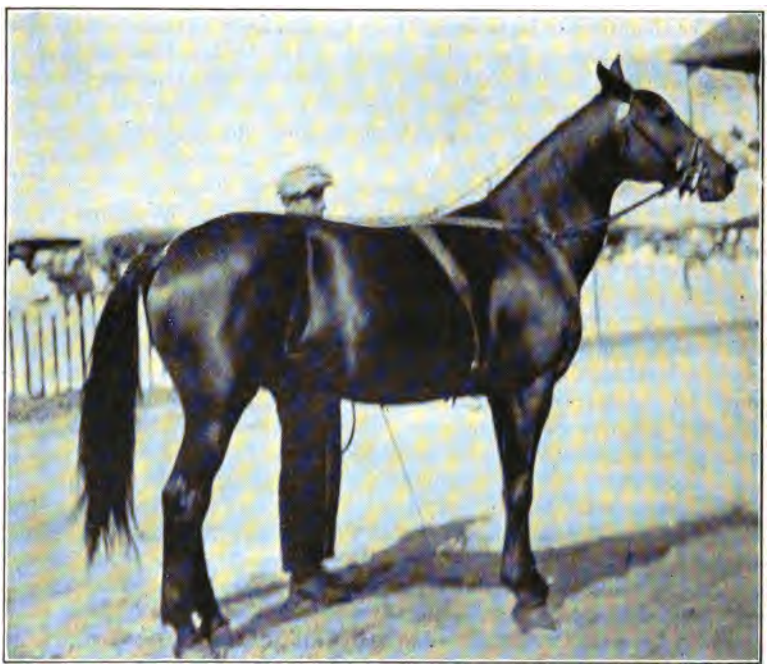


FIG. 246. — Earl of Chatham 36260. Sire of race horses. Has sired 17 standard performers. Stands 15–3 hands high. Black. Excellent bone, conformation, and quality. Owned by Connecticut River Stock Farm, Hatfield, Mass.

were to fail, there would be involved no loss of public funds, since the premises could be rented to desirable tenants, perhaps to employees of the school itself.

The dwelling, the tillable land, and the small buildings for live-stock which might thus be rented to two families might be regarded during the life of the experiment as a sort of "laboratory" device adapted to this special form of agricultural instruction. In all respects, it was held that the homestead arrangement should be looked upon as an educational experiment.

The necessary equipment of small tools should be provided by the families

themselves. They would require but a moderate outlay, and might be regarded as a reasonable guaranty of earnestness and good faith. The more expensive equipment occasionally required by the family could doubtless be borrowed from the school.

Since instruction in gardening and possibly in poultry keeping would undoubtedly constitute the first stages of any course, the expense ought not to be beyond the reach of even a very poor family.

It was recommended in the report that the agricultural instruction for

FIG. 247. — May Chatham. Sired by Earl of Chatham. Winner of 31 blue ribbons and Vermont State Fair Cup. Winner of first premium two years in succession at Eastern States Exposition, Springfield, in the trotting bred roadster class. Never beaten but once, and then by her full brother. Bred and shown by her owner, Mr. W. H. Dickinson of Hatfield. Earl of Chatham and his get shown at every horse show held in the Smith School Arena.

families should be free, just as the instruction given pupils in the existing vocational schools was free. In the cases of families temporarily occupying premises belonging to a school, the cost of living probably would not exceed that of living in tenements.

Under the rules of the school, overcrowding would not be permitted. Consequently, families from city tenements might be deprived of revenue from the taking of lodgers or boarders to which they had been accustomed in the tenements. These families, as well as others moving out from city tenements and

owning or occupying land not furnished by a school, might find themselves under some extra expense for car fares on the part of the wage earners of the family. These losses, it was thought, probably would be more than offset by improved working capacity resulting from more wholesome living conditions and by the supplies of garden and other farm products produced in connection

FIG. 248. — "High School" horse awarded a blue ribbon at an Arena horse show. Doing "cake walk." Smith School, Northampton.

with the agricultural instruction, and either used by the family or sold. Better living conditions, therefore, and a somewhat diminished cost of food and shelter might compensate for increased traveling expenses and the lack of income from lodgers or boarders.

The suggested plan, therefore, of associating the instructing of families in agriculture with the established and supervised home-project plan of vocational agricultural education was believed to be both logical and psychological, and to be no less promising as a matter of efficiency than as a matter of economy.

As to the extent to which such instruction might ultimately be carried, no prediction was hazarded. For the time being, during a reasonable trial period, it was proposed that the instruction should be strictly limited to such teaching as regularly employed vocational agricultural instructors could safely be commissioned to do in connection with, or in addition to, their vocational work proper; and no heavy outlay for plant or equipment for this experiment was recommended.

FIG. 249. — Arena ribbons much coveted. Upper row, horse-show ribbons; lower, poultry show. Blue, red, and yellow. Smith School, Northampton.

**B. Referendum votes by cities** were provided for by the next legislature to which the foregoing findings and conclusions had been reported. At the next state election every city in the state voted in favor of providing agricultural and horticultural instruction for families. Every city was authorized to provide such instruction, even to the extent of providing homesteads, the instruction to be subject to approval by the Board of Education.

**C. War conditions *versus* conditions of peace.** — War was declared against Germany. War garden drives for increased food production followed. Vacant city lots, parts of parks and playgrounds, even parts of cemeteries, were immediately put under cultivation by families. Supervision and instruction of the itinerant type above proposed were provided for, both with and without state aid, in all cities and villages. Such beneficial results as those anticipated have in large measure been realized.

It must be recognized, however, that conditions have been favorable to a far greater degree than they would have been if conditions of peace had continued. Cemeteries, playgrounds, and parks would hardly have been put at the disposal of families for cultivation under ordinary conditions. Slowing down of real-estate operations and patriotic motives combined to bring vacant lots under cultivation which might have been withheld in the absence of the war.

That city and village families respond to opportunities such as those above proposed, and can greatly profit thereby, has been demonstrated.

FIG. 250. — Graduation in arena. Home-making pupils illustrating by series of tableaux advancement from old to new in labor-saving methods and devices. Smith School, Northampton.

**D. The future.** — It is to be hoped that war gardening will lead to peace gardening. Mr. George L. Farley, when Superintendent of Schools in the City of Brockton, apropos the adage that God made the country and man made the town, added that in his judgment "the Devil made the long summer vacation." Playgrounds for children have an important place in caring for and educating children from the pavements and tenements. The author believes that provision should be made by all cities for summer education, of both children and adults, which combines playing with working, preferably

which combines gardens with games, in wholesome balance. If all work and no play makes Jack a dull boy, all play and no work is not the best corrective. Gardening not only gives a child a productive outdoor task. It teaches him property rights, by giving him something to have and to hold, something to protect and to enjoy.

One who has surveyed the needs and possibilities of agricultural instruction for city or village families can hardly escape a sense of re-

FIG. 251. — Seniors showing methods of examining horse for unsoundness. Horse on platform in arena. New type of "commencement part" suited to vocational agricultural school. Smith School, Northampton.

sponsibility for making provision in the educational program for such instruction. The author, in short, heartily concurs with Mr. Henry Sterling and his associates in the Massachusetts Homestead Commission as to the sound tendencies of such education, set forth in the following statement, and commends them for consideration in every state: "Such a movement should be of vast value to the state, diffusing valuable information, promoting the general health, improving the quality of the citizenship, and reducing congestion and criminality."

### 3. Organize Farming on School Land as Projects

Agricultural school or department farming can be resolved as readily as any other farming into more or less independent projects. Efforts in this direction will add materially to the educational value of the farm work of any school or department. The American Association for the Advancement of Agricultural Teaching appointed a standing committee on the use of land. The reports of that committee on the

FIG. 252. — The Smith School and the County Agricultural Schools in Essex, Bristol, and Norfolk Counties hold annual conferences on betterment of agricultural production and long-term planning for rural community welfare. Essex is famous for its "Farmers Day," and Bristol features a County Fair.

use of land by both schools and high school departments were printed by the United States Bureau of Education in Bulletins No. 522 and No. 601, which may be had through the Government Printing Office, Washington, D. C. Projects of the Northwest School of Agriculture and Branch Experiment Station, Crookston, Minnesota, are described as are projects of certain high school departments. These will repay examination.

(1) **This means departmental organization and responsibility.** — Organization of farming on school land as projects naturally leads to, or follows, departmental organization of the school staff.

The agricultural schools in Massachusetts are organized departmentally. Heads of departments who teach the projects are responsible, under the Director, for the projects conducted by their departments. The cleavages of instruction and of management are vertical, from top to bottom, not horizontal. Thus there is no overlapping of functions, no loss of credit for praiseworthy effort, and no evasion of censure for efforts that deserve blame. Needless duplication of equipment is avoided by systems of interdepartment requi-

FIG. 253. — Demonstrating tractor plowing on the school farm at time of county fair. Bristol County Agricultural School.

sitions, by which, with the approval of a director, service, such as team work, may be rendered one department by another.

Director G. H. Gilbert of the Bristol County Agricultural School has a score-card method (See Fig. 288) by which the efficiency of each department in his school is measured and compared with that of all other departments.

The author believes that all agricultural schools ought to be departmentally organized, and ought to adopt such a method of frequent and systematic supervision as to prevent negligence and put a premium upon alert and capable management and work. The work of a department as a whole may be regarded as a project.

(2) **This means, also, individual responsibility.** — Require the agricultural instructor who teaches projects in a given department or division

to supervise and otherwise assist in carrying out the projects of the school in that field. Divided responsibility divides honor for creditable results; and, equally, it divides shame for failures. Put each man on his mettle as an independent producer, and expect him to set a high standard of attainment by which his boys may judge their own results.

(3) **This means cost-accounting every school project.** — Require that every school project shall be cost-accounted in exactly the same

FIG. 254. — Girls of home-making department ready to serve the luncheon they have prepared for the delegates to the county planning conference. Smith School, Northampton.

manner that the school teaches it is practical and imperative for the farmer to cost-account his projects. Agricultural specialists are prone to charge failures, or unprogressiveness, in farming to lack of proper accounting. See to it that your instructors practice what they teach.

(4) **This means a written report on every project.** — Require a written report from each agricultural instructor upon his work, observations, and results in carrying out his projects at the school. Require of him exactly the same sort of report that he requires of his boys in connection with their projects, and the sort of memorandum any farmer might well make while the ups and downs of the projects

on his farm for a season are still fresh in his mind. Time the report to come in at about the moment the instructor ought to be settling, roughly at least, upon his projects at the school for the following year. Thus the report will be a live document, and not merely a perfunctory compliance with a red-tape requirement. Such a report is bound to be, at its best, as much forward as backward looking.

### 4. Assign Half of Each Day at School, in Consecutive Periods, to Each Project Study Class

Spare no pains, in program making at the beginning of the school year, in giving unbroken half-day blocks of time to instructors in

FIG. 255. — Front of building on day of "Better Babies Contest," Hampshire County Conference. Note fleet of baby carriages. Smith School, Northampton.

charge of project study and project work. This suggestion is in accord with the statement of the Federal Board for Vocational Education that, "the time set aside each day for instruction in agriculture should be a unit." (Agricultural Series No. 1, p. 17.)

The half-day unit, as divided and described above in Chapter III, pages 72–76, has in it as much variety and relief as if the pupils were to pass from one non-agricultural study to another. Figs. 57 and 58,

above, may assist in explaining the soundness of the pedagogy — of the psychology and physiology — of such a half-day. The practical convenience will approve itself to all concerned, when work, field trips, and the like, for the time being displace classroom instruction.

In order to make the best use of the half-day unit, be at great pains to coach beginners in the best methods of " Supervised Study," such methods, for example, as those set forth by Professor Alfred L. Hall-Quest in his book on that subject, and those in the report on " Supervised Study and the Longer School Day," prepared by a Committee of the High School Masters' Club of Massachusetts and published by the Board of Education in 1918 as Bulletin No. 94.

By combining first and second year pupils in one group, and third and fourth year pupils in another group, also by centering instruction in stated years upon stated project fields, as indicated above in Figures 47 and 48, and in Chapter III, such assignment of half-days is made easy.

### 5. Provide for " Professional Improvement " Work Every Year for Every Man

As previously stated, " professional improvement " work is a fundamental requirement, and has been from the outset, in the Massachusetts system of vocational agricultural education. The needs and possible programs of such work have, perhaps, been sufficiently set forth above in Chapter VI, on pages 197 to 199.

(1) **Improvement is possible for the best of farmers and for the best of teachers.** — For at least a few years longer, until agricultural teacher-training under the Smith-Hughes Act has begun to produce men of the right type, it is probable that farming itself, rather than agricultural colleges, must often be drawn upon for instructors of requisite maturity and farm experience. One may sometimes safely undertake to make a good teacher out of a man of adequate study of technical agricultural subjects and successful farm experience — out of a graduate of the school of " Hard Knocks," — after he has entered on his job of teaching. It would be suicidal for any system of vocational agricultural education to take good men trained for teaching and after they had entered on their jobs of teaching try to make them

successful farmers. Improvement, moreover, is possible for the best of farmers and for the best of teachers.

(2) **Farm-shop work good winter stop-gaps.** — Leaves of absence for professional improvement work by plant project instructors in winter tend to prevent overdoses of book-agriculture for their pupils. Short units of a month, more or less, in farm-shop work given by a good foreman carpenter who has trained apprentices and handled

FIG. 256. — Seventy-five Hampshire County manufacturers displayed samples of their diversified products in the arena during one of the county planning conferences. Exhibits not to promote sales, but intended to promote county pride and understanding. Smith School, Northampton.

men, and who has a slack season in his trade, help to round out the practical education of the boys and permit the school program to proceed without interruption. Short leaves of absence for professional improvement of live-stock project instructors in summer occasion no interruption of class instruction and little inconvenience.

(3) **Short courses at the State Agricultural College are good winter stop-gaps** for third and fourth year pupils. Such courses are accepted in Massachusetts, when reports of good work are shown, in lieu of

work at a school or department, and credited as meeting in full the requirements during given periods for vocational agricultural diplomas. If, in cases of pupils in agricultural departments of high schools, high school diplomas also are desired, certain academic losses must, of course, be made up by previous or subsequent study, or by studies such as English literature or composition carried concurrently with the winter short courses.

Get Together Plan

People Look to the Newspapers First When They Hunt For Rooms

NORTHAMPT

ESTABLISHED SEPT. 1, 1882 Apr. 8, 1918 Herald NORTHAMPTON, MASS., TH

HAMPSHIRE COUNTY COMMUNITY PLANNING CONFERENCE OPENS

FINE EXHIBIT MADE BY MANUFACTURERS AND SEVERAL INTERESTING SUBJECTS ARE ABLY DISCUSSED BY WELL KNOWN SPEAKERS

FIG. 257. — Prominent newspaper space given these conferences. The Massachusetts Agricultural College and the Hampshire County Farm Bureau were among those coöperating. The College employs an Extension Service Specialist to assist in long-term planning.

Ideas brought back from the college may then be thoroughly scrutinized with reference to their applicability to the home conditions of the boys. Now and then a boy has been described as having returned with a "big head." The sober realities of home life and thorough consideration of ways and means have seldom failed to bring a foolish boy to his senses. Change of scene and glimpses of leading men in special lines of farming, such as the winter short courses usually afford, have helped to fire the ambitions of boys for better things; and, with the patient and sensible follow-up work of capable local instructors, better results have been attained than might otherwise have been possible.

(4) **Project plan of teacher-training.** — In some cases professional improvement work can be accomplished concurrently with teaching and summer supervision. In fact, the first steps in agricultural teacher-training under the Smith-Hughes Act in Massachusetts are being taken by an itinerant trainer who is putting into effect a sort of

project method of teaching teachers how to teach after they get their jobs. From September to the week before Christmas and from March to June, he will go from instructor to instructor among the schools and departments, helping each man as he finds him and where he finds him. In midwinter he will conduct a seminar course for plant project instructors, and part of June and July a similar course for live-stock project instructors, at Massachusetts Agricultural College. These will be, not for all instructors, but rather for the express benefit of those

FIG. 258. — Automobile show in the arena featured April 6–7, 1916, in connection with the county planning conference. Auto-trucks in tent at rear of main building. Only building in the county suited to such an event. Smith School, Northampton.

whose most pressing professional improvement need is to be there with him for study of principles and methods of teaching and for preparation of teaching materials and devices. Just as in teaching boys agriculture the project cycle is from job to classroom or laboratory exercise to job, so here, for both trainer and instructor, the professional improvement cycle will be from job to seminar or other study to job.

(5) **Promotes permanent tenure and increasing efficiency.** — Such professional improvement work is of benefit to the individual instructor, of course; but in Massachusetts it is done on school time, at school expense, and is primarily for the benefit of the school or depart-

ment itself. Provided for ungrudgingly and with a cordially coöperative spirit by both administrator and instructor, it tends toward permanent tenure and constantly increasing efficiency.

(6) **Require annual reports on "professional improvement."**— Following are professional improvement reports from one instructor, Mr. Rudolf Sussmann, for successive years. These, with the accompanying comment, may be found suggestive.

FIG. 259. — Delegates from local organizations assembled for county planning. Group shows president of Massachusetts Agricultural College, superintendents of schools, representatives of selectmen, tree wardens, boards of health, child welfare workers, and others, including state supervisor of vocational agricultural education. Smith School, Northampton.

**Report dated June 4, 1914:**

The following is a report of my "professional improvement" work.

(1) My winter leave began December 19th, 1913, and ended February 28th, 1914.

(2) My vacation for rest began December 19th, 1913, and ended January 1st, 1914. During this time, however, I did considerable orchard and general farm work.

(3) I spent the time from January 3d to February 28th at the Massachusetts Agricultural College taking work in the following subjects: Soil Fertility,

Field Crops, Types and Breeds of Live Stock, Live Stock Feeding, Dairy Bacteriology, Poultry, Fruit Growing, and Beekeeping.

(4) The chief reason for my taking this work was to get in touch with the agricultural educators of the state. I am now better acquainted with them and their systems and theories.

One of my older boys wanted to take beekeeping as a project, and is now doing so. For that reason I took the work in beekeeping. The work in feeding, dairy bacteriology, and types and breeds has a direct bearing upon my

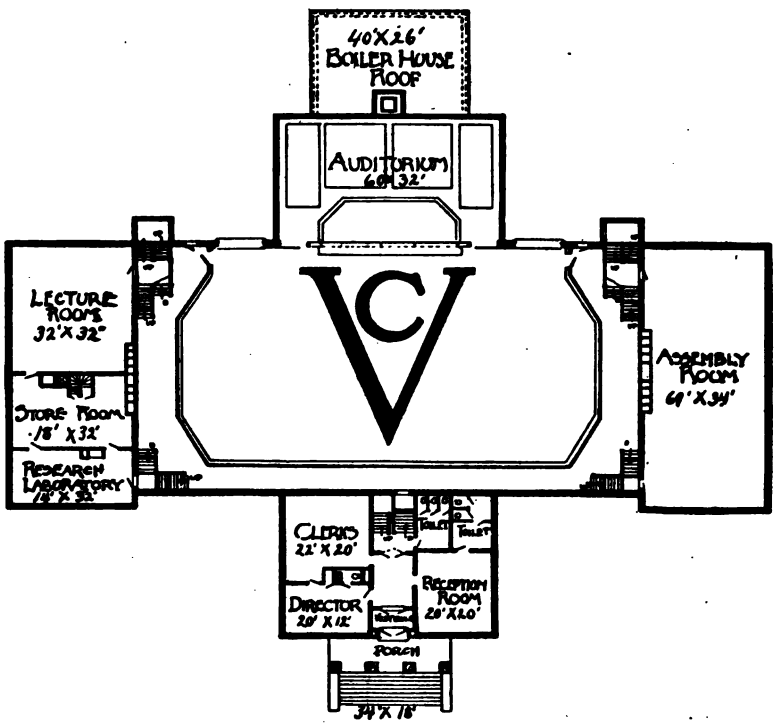



FIG. 260. — Events, like those previously portrayed, wherein the best products of young and old are brought sharply into comparison, put high premiums upon, and offer strong incentives to, vocational efficiency. Assembling, as previously portrayed, old and young, including representatives of varied county-side interests, for comparison of aims, for long-term planning, and for consideration of practical means and methods of betterment, has far-reaching values, cultural and civic. In short, into the very heart of its architecture, no less than into its day to day work, the agricultural school may build its fundamental educational philosophy.

present work. I shall use my added knowledge of fruit growing this fall and of course soil fertility has a direct bearing on all of my work.

(5) At the present time I have no definite plans for my "professional improvement" time for the coming school year.

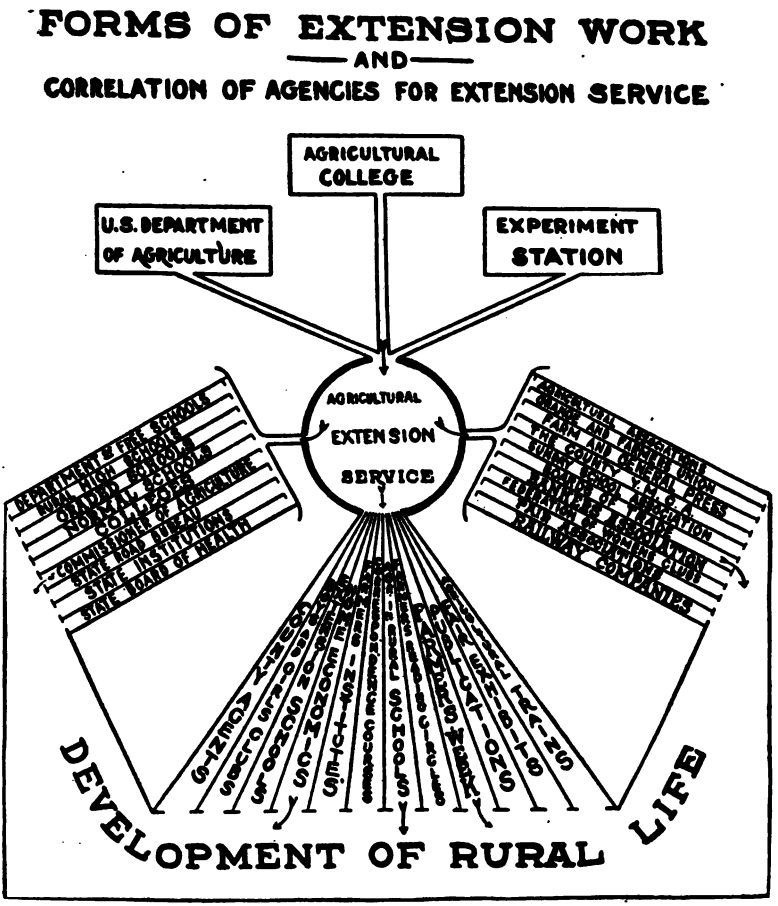



FIG. 261. — An institution organized like this may justly claim for its slogan, "I serve." It indicates a preliminary survey of existing agencies, and a policy, not of displacement or suppression, but of coöperation. It shows a determination not to overlook and not to overlap, — a policy for any institution, large or small, which cannot be too warmly commended. Printed by courtesy of Director C. R. Titlow, Agricultural Extension Department, West Virginia University, Morgantown, W. Va.

**Report dated May 3, 1915:**

I hereby file a report on my "professional improvement" work for 1914–1915.

I spent my time from December 9th to March 8th, with the exception of "conference week" at Amherst (February 23 to 27), in Ashfield, and neighboring towns.

I gave a great deal of my time to coöperating with the manager of the "Ashfield Coöperative Exchange." Together we visited farmers almost daily, talking and figuring with them on fertilizers, spraying goods, lime, etc. Through our efforts six cars (150 tons) of lime, forty-five tons of fertilizing material for

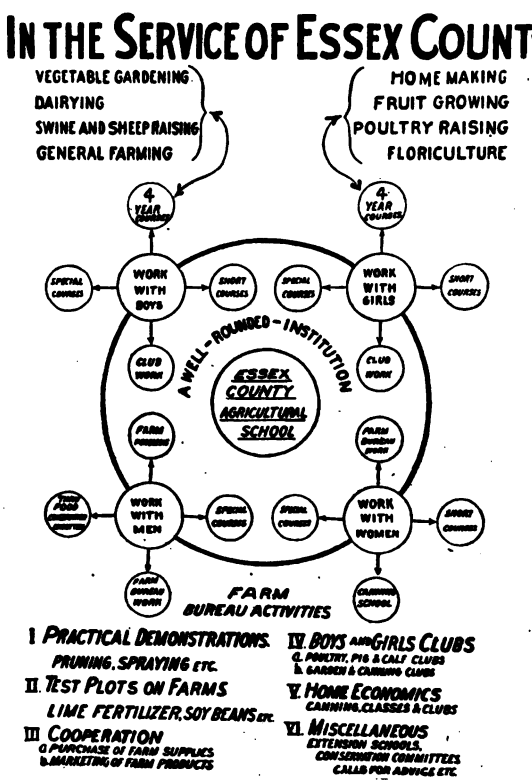



FIG. 262. — The above chart hangs on the walls of the Essex County Agricultural School. It graphically presents the harmonized and interlocked activities of vocational instruction and farm bureau work. The spirit and methods of the county school in Massachusetts are coöperative. See pages 357–398.

home mixing, and one car of lime-sulphur and arsenate of lead were brought into Ashfield.

Early in January I prepared a set of fertilizer formulas, which I used as a basis for advising the individual farmers what to order. This set of formulas was worked out with regard to the potash situation this year. We succeeded in getting all the potash we needed (9 per cent) at $61.00 per ton.

I feel that this work was of very great value to me in my work. I got into the fertilizer question more deeply and thoroughly than I could have in any other way. Each farm presented a new and different problem. In the near future, I will be able, because of data that I now have, to show my pupils specific cases of success or failure with lime, fertilizers, and sprays.

I believe that, because of our conferences on the matter, the farmers who have ordered fertilizers this year realize more than ever the economic importance of knowing just what chemicals they need and using them only.

Besides working with the manager of the exchange, I gave considerable attention to poultry breeding (line breeding), dairying, and pruning.

Several of my pupils undertook to prune large orchards and I spent considerable time supervising them.

I spent several hours each day in study and preparing lessons and material for the spring class work which began on March 8.

As a result of my work here this winter, I feel as though I had a better agricultural grip on the community. I know more about the resources of the farms and the farmer. I know more about the soil, the crops, and the systems of farming used here.

All this will be of vast value to me in my work with the boys, for they come from farms where the conditions are the same as, or similar to, those that I have studied this winter.

In using the community for a textbook, as it were, I feel that I got the most possible benefit for the time spent in " professional improvement."

Though Mr. Sussmann modestly made no mention of it, the fact is that he brought about the organization of the Ashfield Coöperative Exchange. He was helped in this by Dr. Alexander Cance, Professor of Economics at Massachusetts Agricultural College, whose acquaintance he made during his first winter professional improvement work. A further fact should be stated. Mr. Sussmann followed up his drive for purchase of spray materials by the carload with a drive to grade all apples from sprayed trees, to employ only impartial and expert packers for the grading and packing, and to sell the apples under a special Ashfield label; all of which was done.

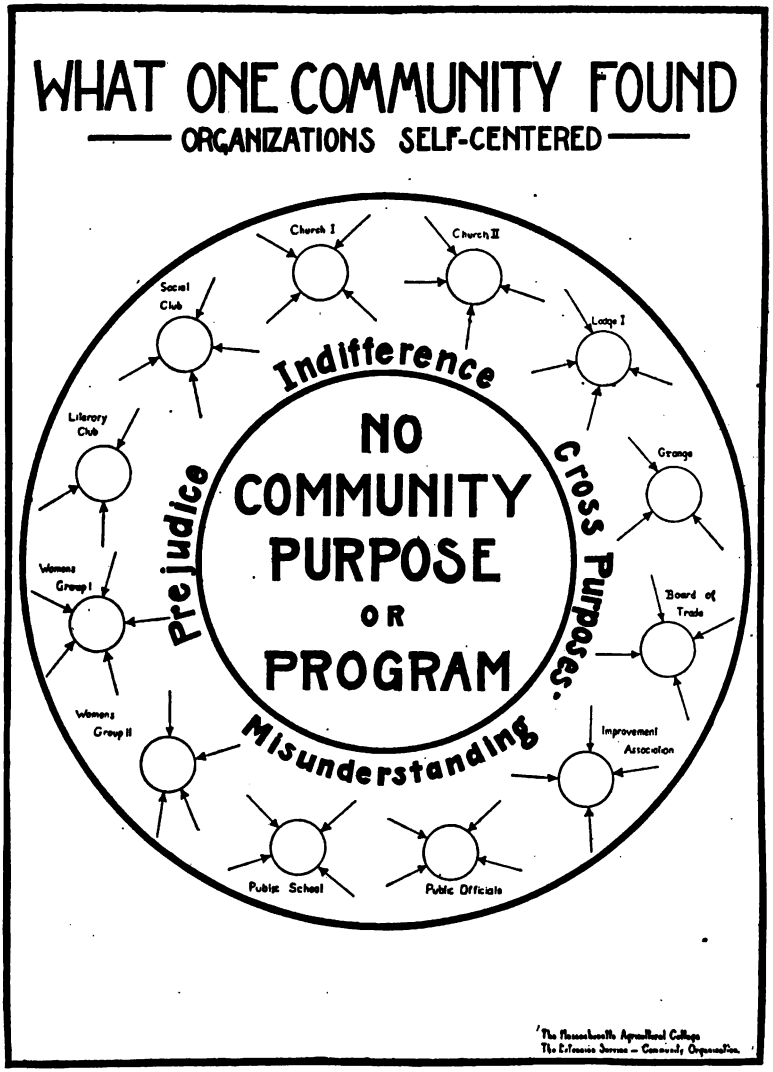
His next logical step in a sort of project method of professional im-

provement, therefore, was to undertake the study of markets for fruit so sprayed, graded, and packed. With the definite objective, therefore, of finding an appreciative market for the Ashfield apples under label then in storage, a study of markets and marketing was approved for his next professional improvement work, the work to be done under the direction of Dr. Cance. A market was found for the apples, — a market so appreciative that the following year the crop similarly prepared for market was instantly contracted for at 15 cents a barrel above the ruling price, provided the fruit opened as well as that of the previous winter.

In addition to Mr. Sussmann's apple market study in Springfield, Worcester, Boston, and New York, certain other items of his winter work in 1915–1916 were the following:

| | |
|---|---|
| Dec. 18–23 | Attended conference of agricultural instructors, county agents, and college extension workers at Amherst. |
| Jan. 9–10 | Attended milk meeting in Boston. |
| Jan. 12–Feb. 3 | Practical pruning studies. |
| Feb. 5–8 | Demonstrations and lectures for Franklin County Farm Bureau. |
| Feb. 12–17 | Continued work for Franklin County Farm Bureau. |
| March 4 | Resumed teaching at Ashfield. |
| March 15 | Discussed Massachusetts plan for vocational agricultural teaching in secondary schools before New England Superintendents at Harvard University. |
| March 22–24 | Made special drive with adult farmers to get them to use lime and fertilizers in larger quantities. |

Mr. Sussmann was new to the state; hence his first winter at the State Agricultural College. He began at Ashfield with salary at $1200 a year. He is now in his second year in charge of the vocational agricultural department in Reading High School, where his salary is $2220 a year. There are records of admirable professional improvement work done by other instructors still in the service. These men are becoming more valuable every year. The foregoing notes and reports may suffice, however, to indicate the aims, spirit, and values of such work, and the desirability of making it a matter of cumulative and permanent record. Professional improvement is safe insurance against educational dry-rot.




This chart is exaggerated to lend emphasis but it gives a true picture of the general tendency among local organizations to put their own selfish interests first and the lack of planning.

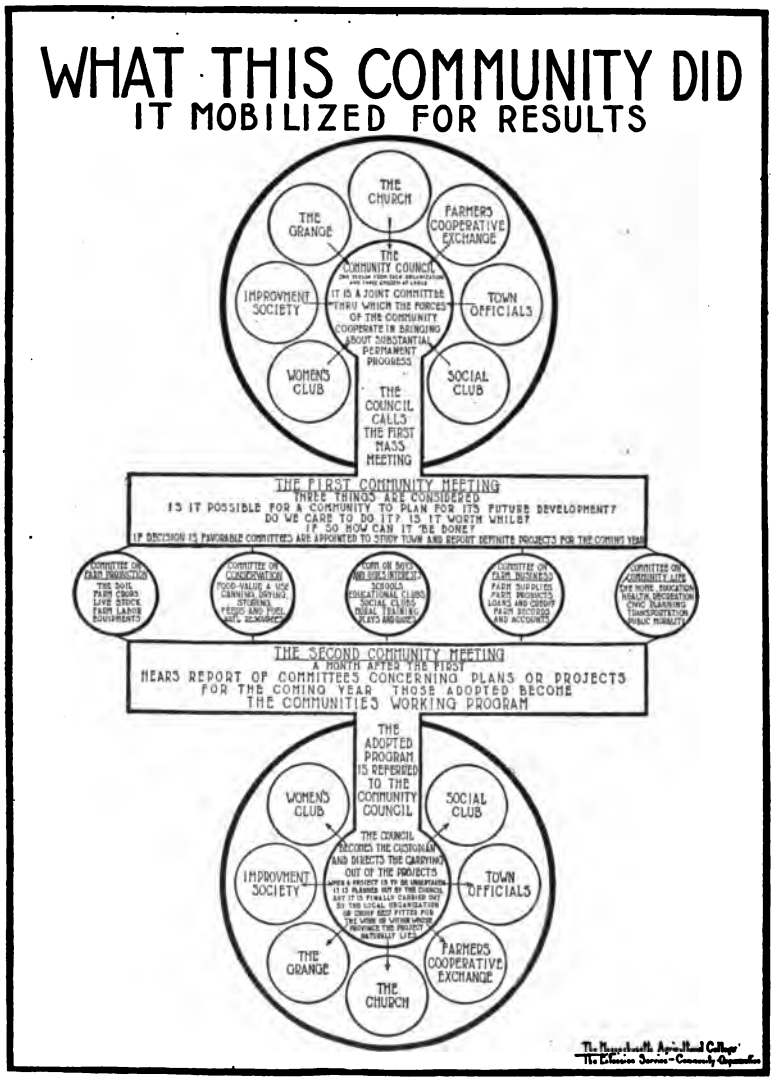
FIG. 263. — Good community organization is no less important than that of county and state. The above chart and the charts in Figures 264 and 265 are from "Mobilizing the Rural Community," Extension Bulletin 23, Sept., 1918, issued by Massachusetts Agricultural College, Amherst, Mass.

### 6. Require Teaching by Projects, not by Subjects

(1) **Require preliminary project surveys and agreements.** — There can be little assurance that instruction will be by sound and thorough project teaching, as distinguished from subject teaching, in the absence of evidence that each agricultural instructor has first-hand knowledge of the home farm conditions of each boy in his class. A combined home-farm survey and application and agreement card has been found serviceable in Massachusetts. The front of the card for day class pupils is shown in Fig. 290, page 390; and the back of it, in Fig. 291, page 391. This card is a stock size, 4″ x 6″. It will be noticed that this is a tab-card. A similar card for evening class pupils is shown, front and back, in Figs. 294 and 295, pages 400 and 401. You may make assurance doubly sure that such surveys are made by requiring instructors to file summaries of these preliminary surveys with you at the beginning of each new school year covering all pupils admitted. The first summary of this sort filed in Massachusetts is shown in Fig. 292, page 392. Somewhat better summaries are now on record.

(2) **Require systematic project inspection and supervision records.** — If back of the cards described above are filed copies of project inspection and instruction slips like that shown in Fig. 303, page 427, reasonable assurance may be had that the agricultural teaching is centering on the projects for which the boys are preparing or which they have seasonably undertaken. The slips may be made up in pads to be inserted in covers like that shown in Fig. 303, page 427. Oilcloth covers have been found to be more satisfactory than board covers, because they suffer less damage from sweat and rain. One color is used for the sheet left with the pupil; and another, for the sheet filed at the school or department.

Such inspection and instruction records are invaluable in case of change of instructors. The new man can see at a glance what experience his predecessor has had in dealing with parents and pupils. They are valuable, too, in cases of controversy. If the instruction has been sound, and if the instructor has been particular to ask that each slip be signed before leaving it, his slip becomes a voucher. On a given date he was at a given place and left the commendation, the




This chart shows the actual steps taken by the community in mobilizing its forces and developing a practical working program.

FIG. 264. — Steps in community organization. See also Figs. 263 and 265.

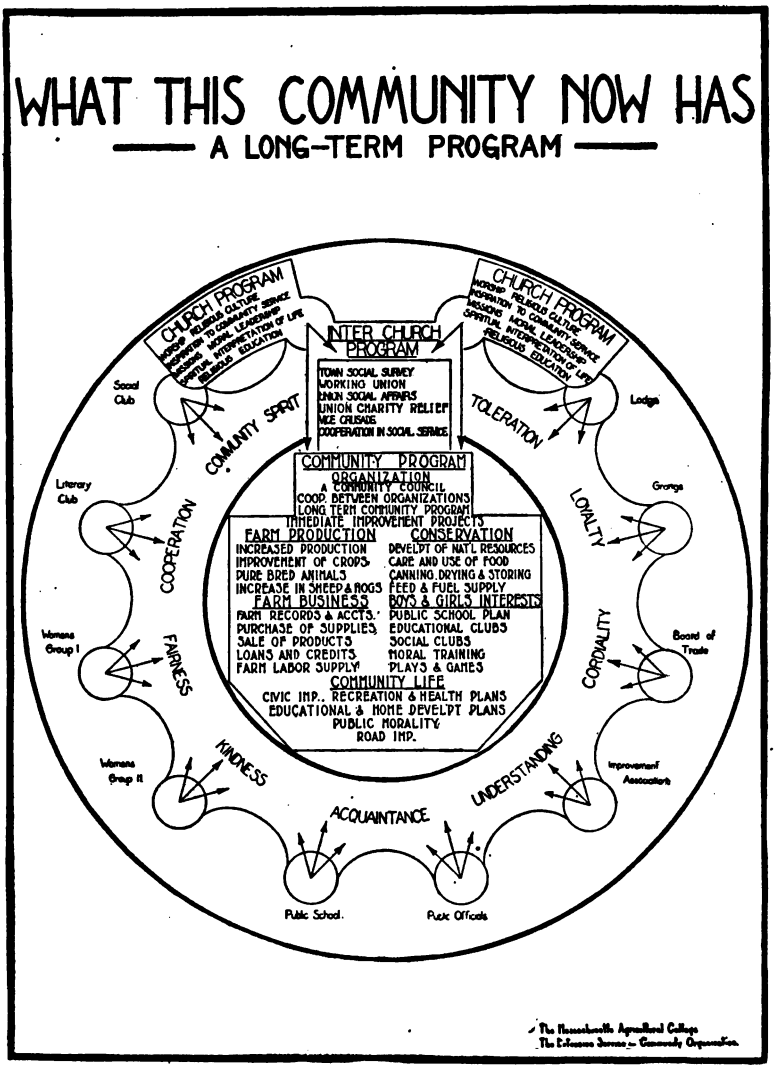
criticism, or the directions indicated. An impartial committee may then judge as between him and any accuser. If wrong, he cannot escape; if right, his voucher, signed both by himself and another, is his sufficient defense. In itinerant teaching and in occasional advisory work, such records are conducive to simplicity and definiteness of statement, and are important aids to the memory of both advisers and advised, of both taught and teacher.

(3) **Require project study outline making or adaptation.** — Project study outlines made by each instructor to fit exactly the home conditions he finds are most to be desired. Examples of such outlines were presented above in Chapter IV.

More rapid headway can be made by adopting a state system of uniform numbering for reference materials, like that presented above in Chapter V, and by combining and printing outlines for use throughout the state system. If the latter plan is followed, each instructor must interline questions and references at many points, and must mark for each boy material which is at once within that boy's grasp and suited to the demands of his particular project. In this case, too, the tendency to "lie down" on the outline made by others or by another, to "take it from cover to cover," must be guarded against.

If a state system of uniform numbering of reference materials is not perferred, it is still highly desirable to reduce the labor of outline making as much as possible by eliminating all unnecessary writing. Each outline may have its special bibliography with arbitrary numbers assigned entries. Then, by such a price tag device as that shown in Fig. 51, page 65, the books may temporarily, during the period covered by the study of that outline, be given those arbitrarily assigned bibliography numbers.

(4) **Require seasonal planning of related study and practice.** — Require planning of instruction which shall not merely be seasonal and show the time allotments during the year to the several stages of project work, but which, also, shall show what shop, laboratory, and other related study exercises are to be given from month to month. Examples of such seasonal outlines are shown below in Figs. 296, 297, and 298.




This chart is also exaggerated to give emphasis. It shows the goal toward which a community should work — a definite working program with all groups bound together for the achievement of the common good.

FIG. 265. — A long-term program for a rural community. See also Figs. 263 and 264.

By such means, the instructor forecasts the work for the year, and is able to apportion time with intelligent reference to the relative degrees of importance of the various elements of work and study which should receive attention.

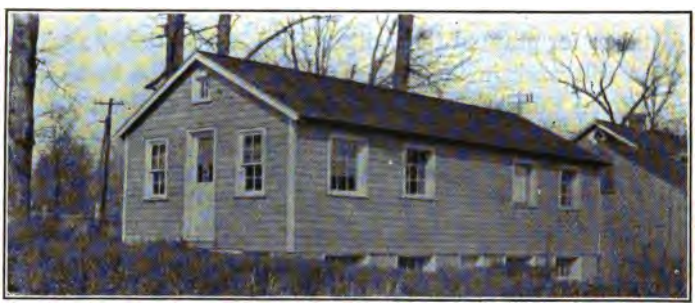
That projects, themselves, differ, that they ought not all to be taught alike, and that this fact has a direct bearing upon the seasonal planning of instruction is appreciated by the pupils themselves. This is clearly evident, for example, in the excerpts from the written report of a fourth-year pupil given on pages 428 and 430.

### 7. Provide for Teamwork

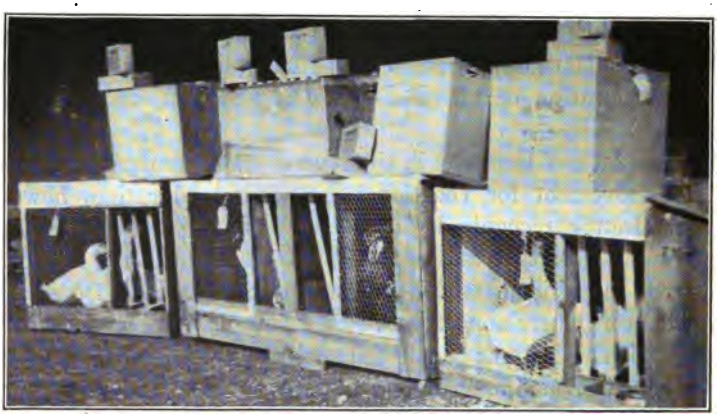
It is taken for granted that all engaged in vocational agricultural education will work in the closest harmony with the Federal Board for Vocational Education. This Board is bound to exert a powerful influence upon aims, methods, and standards throughout the country. The United States Bureau of Education must approve all federal aid for instruction given by the state agricultural colleges; and the United States Department of Agriculture is the approving body in connection with federal aid for agricultural experiment station and extension work done by the State Colleges of Agriculture. It is fortunate that both the Bureau and the Department are represented in the membership of the Federal Board for Vocational Education. Harmony throughout the federal-aided systems of agricultural education of all grades, in the long run, should be well assured.

Possible lack of harmony in the several states at the outset of the general movement for vocational agricultural education, however, has been frankly recognized. In the fields of federal-aided vocational agricultural education and of extension work aided and controlled jointly by the agricultural colleges and the United States Department of Agriculture, there are certain twilight zones. Both have authority to work with both young people and adults. The former must provide systematic instruction, including at least six months every year of supervised work on farms. The latter must also carry instruction to farms. A joint committee of the Federal Board for Vocational Education and of the United States Department of Agriculture has

Famous Pekin and Indian Runner ducks.



No frills. Office, workroom, and incubator cellar.



These packages ready for shipment to Oregon, Arkansas, and Brazil.

FIG. 266. — Instructor Burke of Hadley did his professional improvement work, the winter of 1918, on Pratt Experiment Farms, Morton, Penn., noted for Pekin and Indian Runner ducks, S. C. White Leghorns, R. C. and S. C. Black Minorcas.

declared that a plan for each state should be worked out by the administrative officers in charge of vocational agricultural education and the director of agricultural extension work to provide for coöperation, division of labor, and prevention of duplication in expenditure of federal funds within any given area.[1] It is no less important that there should be similar coöperation, division of labor, and prevention of duplication of effort and expenditures, as between vocational agricultural schools or departments and other state and local agencies which have to do with agricultural education.

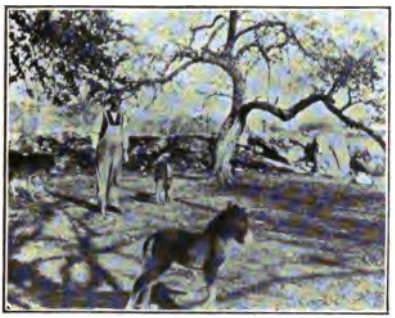
Teamwork, in short, is desirable all along the line. Following are suggested procedures such as those by which good teamwork is being promoted in Massachusetts.

(1) **Coöperate with educators.** — Of foremost importance is it that there should be close coöperation among those who are receiving public funds for agricultural education, in order that there shall be neither "overlapping" nor "overlooking."

**A. Coöperate with the State Agricultural College.** — The problem of teamwork between vocational agricultural instructors and the United States Department of Agriculture has been simplified by an agreement that the extension work of that Department in Massachusetts shall be done through, or in coöperation with, the Massachusetts Agricultural College. This applies both to extension work centering at the College and to extension work aided by state and federal funds which is done by the county farm bureaus.

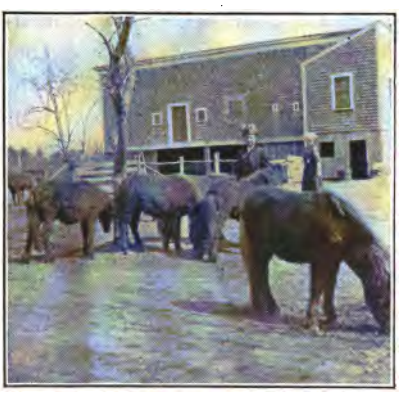
At the College the past five years joint conferences have been held in winter of vocational agricultural directors and instructors, agricultural county agents, and college extension workers. More recently these have been held the week before Christmas. Winter short course crowds have thus been avoided, and specialists, College, Station, and Extension, have been able to be present. At these conferences projects and policies for the following year have been agreed upon. Good teamwork could hardly be expected in the absence of such conferences. Not everything desired has yet been accomplished, but much headway has been made. The programs have been arranged jointly by the

[1] See Federal Board for Vocational Education, Bulletin No. 13, Agricultural Series No. 1, pages 22–23.



Three baby Shetlands sired by "King Edward XX."

"King Edward XX," 10032, registered Shetland stallion.



In rough winter coats. Hardy. Forty in the herd.

"Jessie Queen," 14710, sired by "King Edward XX."

FIG. 267. — Pony farm in Raynham, owned by Mrs. W. A. King. A business investment. "King Edward XX" is valued at more than $300. "Jessie Queen" sold to family in Brookline, Mass. Mrs. King says six ponies could be kept for the cost of one horse fed 12 qts. of grain a day; and that if more farm boys had ponies of their own, fewer would leave home. Visited in 1917 by the "Conference on Wheels" of agricultural directors and instructors.

Director of the Extension Service and the author as state supervisor of vocational agricultural education.

The College, instead of employing a big staff of little men to deal with individual farmers, has employed a relatively small staff of big men — men who in a very real sense have been specialists. These specialists assist vocational agricultural instructors and county agents in emergencies. Their service is primarily to groups of farmers, and to agricultural directors, instructors, and county agents. Local arrangements for visits, demonstrations, and short courses are made by the local directors, instructors, or agents, and the follow-up work is done by the local men. The relationship and functions are not unlike those of the general practitioner and the specialist in medicine or surgery. The local men are the first diagnosticians. The specialists are the consultants or perform the major operations. The local men take care of the day to day, week to week, or month to month treatment. Thus, in essential and valuable ways, each aids and supplements the work of the other.

Of course, the College, including the Experiment Station, ought to be, and is, a sound and indispensable source of agricultural subject-matter; and to the College is reserved all purely research or experimental work.

Because it is the most important source of agricultural subject-matter in the state and because it is the home office of the agricultural specialists, the College is the place where the seminar work in agricultural teacher-training will be done.

**B. Coöperate with other state agencies for agricultural education.** — The State Board of Agriculture in Massachusetts has educational duties. Of special value has been its policy of putting both practical farmers and agricultural professors and research men on the same platform at its annual meeting, and of printing both their discussions and the discussions from the floor. Much material of value to vocational agricultural instructors has thus been prepared, and has been distributed to them gratis on their request. This Board also handles all state grants for agricultural prizes, and has valued suggestions from those responsible for vocational agricultural education as to kinds of desirable contests and the awarding of the prizes. It has had

funds with which to provide for local lectures and has welcomed requests from instructors for such lectures. In other ways the Board has responded to requests of instructors for help.

FIG. 268. — Pleasure horses are bred by Massachusetts men. "Marlboro," hackney stallion, owned by Judge W. H. Moore of Pride's Crossing, Mass., and New York City. Get of "Marlboro" won nine blues and a championship in 1917, and eleven firsts, five seconds, one third, two championships, and two reserves in 1918, at the New York Horse Show. In 1918, Judge Moore won a leg on the American Hackney Horse Society's $1000 cup for the best team of hackneys, bred and driven by the owner. His team consisted of four bays by "Marlboro" — "Seaton Cyrano," "Moncrieff," "Mona," and "Medea." It was the first four-in-hand team ever shown at the Garden of horses bred by the driver, the author was told; and the first time in America, if not in the world, that four hackneys ever have been shown under these arduous conditions.

The State Forester, also, has welcomed requests for printed matter, for lectures, for young trees to use in forest planting on school or home land and for help in gypsy and brown-tail moth control, control of the chestnut bark disease and the like.

Such sources of assistance should not be overlooked.

**C. Coöperate with county farm bureaus.** — It is the ruling practice, with hardly an exception in Massachusetts, that the agricultural instructors represent the farm bureaus in meeting most of the needs for agricultural county agent work in their several localities, and in heading up the local agricultural club work. This economizes time and travel for the farm bureau men, and enlarges the acquaintance of the instructors with farmers not represented by boys in their classes, and with their pressing problems. Where the farm bureaus are es-

pecially strong and maintain a staff of specialists, the supplementary relationship of the instructors and these specialists is like that above described between the instructors and the specialists of the agricultural college extension service.

The author proposed, and was able to have introduced into the legislation authorizing county aid for farm bureaus, the provision that there shall not be a separately organized county-aided farm bureau in a county which maintains a county agricultural school. The county agricultural schools maintain both farm bureau staffs and staffs for vocational agricultural education. The staffs of these schools include agricultural county agents, home-demonstration agents, and agricultural and home-making club leaders. The school specialists assist the farm bureau workers, and *vice versa*.

FIG. 269. — "Seaton Saxton," sired by "Marlboro" and typical of his get in solid color, in conformation and quality, and in action. Six weeks old. Judge Moore says this is best age at which to select. If good at this age and nothing happens to them, likely to be prize winners at maturity. His manager, Mr. George Chipchase, agrees. At the New York Horse Show in 1918, at three years old "Seaton Saxton" won two blues and the championship challenge cup. "Seaton Dunbar," also by "Marlboro," was sold in the ring for $5000 to one of the saddle horse judges. Judge Moore refused an offer of $10,000 for "Seaton Saxton." From stable of national and international prize winners.

In Massachusetts, therefore, in the counties of Essex, Bristol, and Norfolk where there are such county schools, there is perfect teamwork.

Wherever county schools are maintained, the author is profoundly of the opinion that such unity and harmony of administration and

instruction as the foregoing should be regarded as fundamental to economical and efficient expenditure of effort and of public funds.

**D. Hold "conferences on wheels."** — In addition to assembling the agricultural directors and instructors for the joint conference in December with the College Extension Service and farm bureau workers, the author, as state supervisor, has called the agricultural directors and instructors together annually in midsummer for a conference with each other on methods of instruction and supervision.

FIG. 270. — "Scimmeter," son of pure-bred Arab stallion, "Segario," Major Vidmer up, at El Paso, after 5 years in U. S. Cavalry. Bred and presented to Major Vidmer by Mr. Spencer Borden. Dam, trotting-bred.

This conference has generally been held late in July and early in August, at the time of the annual Rural Progress Conference called by the Massachusetts Agricultural College at Amherst. Incidentally the men have been shown how the college men practice on the college farm in summer the doctrines promulgated by them in winter as practicable for the improvement of farming elsewhere in the state. Incidentally, also, they have become acquainted with the ideas and aims of workers in the numerous organizations which, in one way or another, have betterment of farming and country life at heart.

More recently, the summer conference plan has been modified. The directors and instructors met in 1917 in the eastern part of the

state. An itinerary for the week was planned which began in Essex County and ended on Cape Cod. Opportunity for conference on methods and equipment was given, but also opportunity to observe methods and equipment in use. A man scheduled to open a discussion opened that discussion on his own premises. His discussion had not only the force of his words and of his reasoning; it had, also, the force of his example. His fellows could see that he had what he said

FIG. 271. — A sister of "Scimmeter." Mr. Borden has been breeding Arabs and Arab crosses for 20 years, and has presented a half dozen to officers for the grueling tests of cavalry service. His fine animals were seen at "Interlachen," Fall River, Mass., in 1917 by the "Conference on Wheels."

he had to work with; and that he did with it what he said he did. In particular, the achievements of his pupils were judged on the spot. Home projects were visited, school projects were looked over, and calls at notable farms were made *en route*. Such conferences bring theory down to the bed rock of practice. They make possible the most intimate and personal exchange of ideas. They promote pleasant fellowship in service. They impress the individual instructor with the feeling that his school or department is not a lone post of solitary endeavor, but part of a movement state-wide in its sweep. And they

tend to elevate educational practice everywhere to the highest level found anywhere.

The dominant theme of the 1917 Summer conference was "Supervised Study." Discussion of it was opened and conducted by its well-known advocate and exemplar, Professor Alfred L. Hall-Quest. Travel was by automobile, instructors who came without their cars paying 2½ cents a mile. Professor Hall-Quest said that was the first conference of the sort in which he ever had participated. He called

FIG. 272. — "Segario," pure-bred Arab stallion, owner, Mr. Spencer Borden, up. Sire of "Scimmeter" and other winners in peace and war.

it a "Conference on Wheels," and said he thought that type ought to be adopted for other teachers.

Conferences of vocational agricultural instructors, with the dominant themes varied from year to year, are indispensable aids to professional progress. The 1918 conference was held in the west central part of the state, with headquarters at Massachusetts Agricultural College. Thus, in alternate years both the State College projects and the projects of schools and departments are seen. The author is of the opinion that in this field of education, at least, no summer conference can be made so valuable as can the conference that is held on wheels.

The summer and winter conferences described in this chapter cover together about two weeks, and are the irreducible minimum of professional improvement activities required annually of all directors and instructors. In them all heartily coöperate both for their own good

FIG. 273. — "Halcyon," three-quarters Arab and one-quarter thoroughbred. Famous long-distance saddle mare. Winner in 1913 of Morgan Horse Club endurance ride, ending at White River Junction Fair Grounds. Carried 180 pounds. Covered 154 miles in 30 hours and 40 minutes. Photograph above taken at finish of this race. At 1913 National Horse Show in New York, she was the only American horse in the ribbons in the broad jump for officers' chargers, covering 18 feet 6 inches and beating 33 horses representing the armies of seven nations, including all those entered by England, Canada, and the United States. Dam of "Kingfisher." Bred and owned by Mr. Spencer Borden. See Figs. 274, 275, and 276.

and for the good of the vocational agricultural education service throughout the Commonwealth.

(2) **Coöperate with farmers. A. Broadsides of criticism.** — In the name of, or on behalf of, the farmer, occasional broadsides of criticism are hurled at the older agricultural education system of the

Copyright by Underwood & Underwood, N. Y.

FIG. 274. — "Kingfisher," Colonel (then Major) Frank Tompkins up, at right. Sired by Mr. Spencer Borden's Arab, "Imamzada"; dam, "Halcyon." A seven-eighths Arab, one-eighth thoroughbred. On raid after Villa and his outlaw band in 1916. Of him Colonel Tompkins wrote the author, in 1918, in part as follows:

"From March 15 to March 26 he was ridden 219 miles and from March 31 to April 12, 362 miles, across the deserts, over the mountains, and through the waterless wastes of northern Chihuahua, carrying his rider and food for man and horse, in addition to the usual pack an officer must take when operating in a hostile country far from the base or of communications, a load well over 200 pounds.

"After marching 219 miles in 11 days on less than half forage, on March 31st he led a small band of horsemen in a dash after Villa which ended in the fight at Parral on April 12th; covering a distance of 362 miles in 13 days.

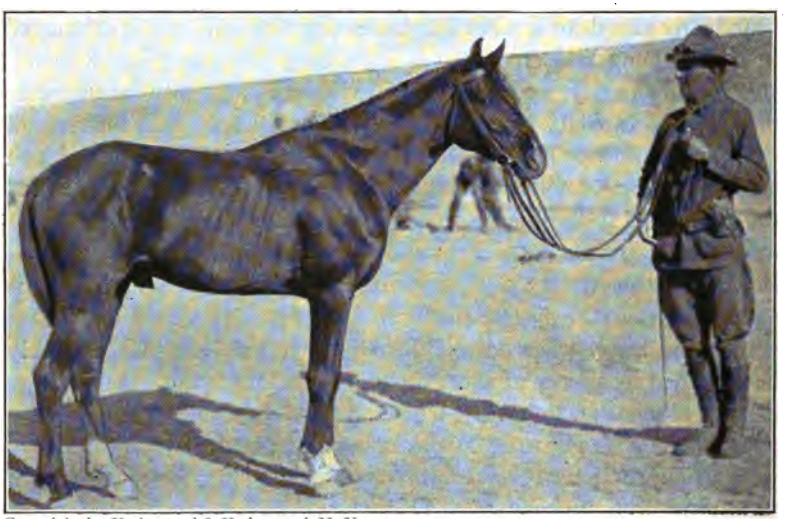
"He never showed any signs of fatigue, never lost courage, and was a constant inspiration to his rider. He lost but little flesh, always moved with a quick springy step with head and tail alertly raised, animated and watchful. In battle he was fearless, being quite content to keep on the firing lines without fuss or objection. He was never sick."

country. In spite of a half-century of effort, it is charged that little of real effect for the improvement of agriculture has been accomplished. In 1916, for example, Messrs. Lapp and Mote, on page 50 of their book, "Learning to Earn," stated the case thus: ". . . after forty years of agricultural education, such as it has been, we are confronted with worse conditions than when knowledge of agriculture first began to get serious attention. Average yields of farm crops have been either practically at a dead level or are decreasing, the soil is being exhausted at an alarming rate, tenantry is increasing, the rural population is shifting to the city, and the cost of living rises at a rate far in excess of increased capacity to pay. The facts are simply that the data of agricultural science have not been put into the possession of the men who till the soil." There have been others who have even charged that the older system has been all wrong.

B. **A fair answer** to such broadsides, whether against the agricultural education system of the country or against that of any state, is not to say that the system has been all right. There are certain inherent and inescapable defects in long-range service which can only be remedied by service at short range. The state agricultural colleges and experiment stations as a whole adopted this view when they requested the United States Department of Agriculture not to do any work of instruction or research in their several states, except through definite projects mutually agreed upon and coöperatively carried out by them and the Department. The United States Department of Agriculture acquiesced in this view when it became a party to a memorable "memorandum of agreement" to the foregoing effect.

C. **The long-distance educator.** — The agricultural educator under the old system had the defects of his virtues. It was important that the investigator should withdraw from the tumult of affairs in order that in working out solutions of certain problems fundamental to improved farming, he might be unhurried and unworried. It was important that the college professor should realize that by his success in the preparation of men trained in certain fundamental details of method and technique for investigation, his professional standing was in no small measure to be judged. But both methods and language became more and more technical, less and less like the methods and

the language found on farms. It will be hardly going too far to say that a feeling of caste crept in, that the professor of the book and of the laboratory and the investigator of the laboratory and of the research bulletin came to look upon other so-called educators as being not of the elect, as being somehow inferior, in fact pseudo-agricultural scientists, or even panderers to popular favor.



Copyright by Underwood & Underwood, N. Y.

FIG. 275. — "Kingfisher" at end of Villa raid. See Figs. 274 and 276.

The long-distance man did not speak the language of the farmer. In extreme cases, he hardly so much as set foot on a farm. There came a time, therefore, when administrators of agricultural education themselves said that this condition of things was not all right.

**D. The middle-distance educator.** — Administrators of agricultural education did not, of course, throw away what had been gained. It probably is true that training of agricultural research workers, and that agricultural research itself, profound and unhurried, were never better safeguarded than now. On the contrary, they took steps to remedy the defects of the virtues of the system by training and putting into service the middle-distance man, the man who spoke the language

of the farmer, who understood the language of the scientist, and who could stand as interpreter between the two. Such middle distance men were the editor of the so-called popular agricultural circular or farmers' bulletin and the itinerant agricultural extension worker.

**E. The short-distance educator.** — Shorter distance men than even the agricultural editor and extension worker were found necessary.

FIG. 276. — "Kingfisher," Colonel Frank Tompkins up, two years after the Villa raid. Blue ribbon winner in contest for best officer's mount at Camp Devens, Ayer, Mass., in 1918. When Colonel Tompkins was ordered "over there" and directed to leave his horse here, Mr. Borden told him he would take care of "Kingfisher" at "Interlachen." See Figs. 270 to 275. "Interlachen" visited by 1917 "Conference on Wheels."

The Congress probably never had had its ear closer to the ground than when it adopted the policy and provided for the program of a county agricultural agent for every county in the country, and, almost simultaneously, provided federal aid for, next to the farmer himself, the shortest distance man of all — the vocational agricultural instructor.

The vocational agricultural instructor where the home-project plan is in operation finds himself as much on farms as in classroom or laboratory. The institution he serves can never become an end in itself. His task is to bring to bear for the benefit of farmers he knows, old or young, and of the farms on which with them he works, the best the agricultural education system of the country has been able at any time and anywhere to develop. In short, it may suffice to say that, if the home-project plan of teaching agriculture is generally adopted,

FIG. 277. — "Fairholme Footprint," Grand Champion Clydesdale stallion at the International in 1916 and 1918; Champion with get in 1918. A prepotent sire. Owned by Mr. F. L. Ames of "Langwater Farms," North Easton, Mass. See Fig. 278.

and if the right spirit and methods of coöperation prevail, the system of agricultural education in the country as a whole can be put into perfect balance and kept in perfect working order.

**F. Give farmers a place of honor and influence.** — But farming cannot be done for farmers, it must be done with them and in the last analysis by them. As vital to the success of vocational agricultural education, therefore, is coöperation with farmers as is coöperation with educators.

**a. Invite farmers to coöperate as advisers.** — If farmers assist in adapting a course of study to local needs, they will understand the

contemplated values of that course a thousand times better than if it is merely prepared for them; and their attitude toward it will be radically different from what it would have been if they had felt the course had been thrust upon them. Similarly, if they assist in the selection of an instructor, they will feel that he is their man and that they must do everything possible to help him to succeed, — an attitude toward him devoutly to be desired.

**b. Invite farmers to coöperate in instruction.** — More than one instructor will find farmers in his locality who can teach certain things

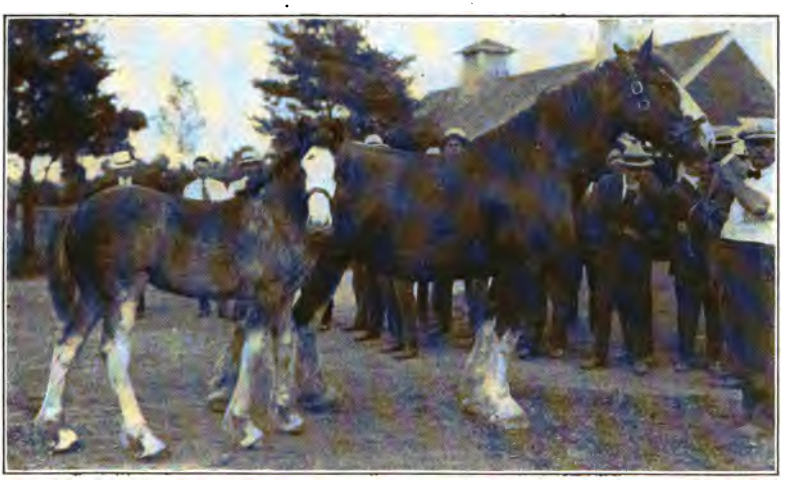


FIG. 278. — "Jess of Craigwillie," sired by "Fairholme Footprint." Beside her pure-bred dam. "Langwater Jessica," yearling, sold for $3000. See Fig. 201.

better than he can teach them. He need not announce this from the housetops; but he will be honoring real merit and strengthening the work of his courses, if he will invite, or persuade, if necessary, such farmers to demonstrate for his pupils and the public their ways of doing those things. On the other hand, if he has been well chosen, there will be hardly a farmer in his locality to whom he cannot render valuable service; and the farmer who feels that he has helped the instructor is so much the more willing to be helped by the instructor. Agricultural instructors who have neither land nor live-stock are most

fortunately placed for promoting such coöperation. Possession of land or live-stock may hinder, but it ought not to prevent it.

c. **Invite farmers to examine pupils.** — No more valuable supervision of instruction in Massachusetts has ever been given than that in which advisory committee members have participated. Farmers have visited classes, observed work, asked questions, and made comment out of their ripe experience. They have visited projects at

FIG. 279. — "Langwater Steadfast," one of the famous Guernsey sires of "Langwater Farms." Mr. F. L. Ames, the owner, center, in Home Guard Uniform. Two North Easton Agricultural Department boys working here. Mr. Ames showed his fine Guernseys and Clydesdales to the 1917 "Conference on Wheels," and kept the party of more than fifty to dinner. See also Figs. 190, 201, 277 and 278.

schools and on the home farms of the pupils, and their words of encouragement or of admonition have been invaluable aids to progress. Public exercises at which pupils have made demonstrations and reports have held farmers for two and three hours, have contributed to the interest of the pupils in their work, and, incidentally, have led to requests from farmers present for short units of instruction in one or another of the fields of agricultural science or farm practice dealt with in these exercises. Of course, in a very important sense, every pupil who conducts a home project is under perpetual examination by both

his parents and his neighbors; since they are on tiptoe to know what he is doing, how he is doing it, and why he is doing it that way instead of some other way.

**d. Avoid dormitories as a hindrance to coöperation with farmers.** — Recently the author received a request from the superintendent of an agricultural school in another state for information about the home-project plan. Not long after he received an acknowledgment, accompanied by the statement that the superintendent found the plan not adapted to his conditions. There must have been farms and farmers all about him. There must have been farm boys in his classes. One can only surmise that his had become a school of the self-contained

FIG. 280. — "Conference on Wheels" at one of its stops. Group photographed on front steps of Bristol County Agricultural School. See pages 364–367.

type in which dormitories had come between him and the farms of his locality.

Dormitory schools may become good health resorts. Farming has the reputation of being a health-giving or a health-sustaining occupation. If an agricultural school is in a desirable location and has modern sanitary appointments, the tendency is for it to become the mecca of pupils in precarious health whose parents are more interested in physical betterment than in vocational agricultural education.

Or, dormitory schools may become good reform schools. Dormitory schools not infrequently include military training in their curricula. Any good dormitory school becomes well known for its strict discipline, with the result that parents of more or less incorrigible pupils rest

upon their rights as taxpayers and in their hearts seek the benefits of the school as a disciplinary institution rather than as a school for vocational agricultural education.

Of course good health and good discipline are everywhere and always to be desired. But there is the modern axiom in caring for wards of the state that "Almost any home is better for a child than almost any institution." Good health and good discipline can be had without dormitories.

Certain it is that vocational agricultural pupils should, from the first moment, be looked upon and treated primarily as farmers. Living and working on farms, preferably not on school farms, throughout the

FIG. 281. — All work and no play makes Jack a dull boy. Athletic field. Convenient and spacious. For indoors recreation space see Arena, Fig. 241. Lockers, shower baths, hot and cold water. Smith School, Northampton.

course of training, are regarded by the author as most to be desired. The hours are farm hours; the food, farm food. Pupils "keep their hands in" on farm work. It is notoriously difficult to "get your hand in" again, once you have got it out of any occupation. If the projects of a school are real farm projects, and if all of the work is done by pupils, then a small percentage of the enrollment may be able to keep their hands in on the manifold operations of farming at a school. Their ability to do this, however, will depend upon keeping the number employed small, too small to justify a dormitory system in any ordinary sense of the term.

**e. Make school land and live-stock help and not hinder coöperation with farmers.** — Land and live-stock and attendant operations at a school tend to make a school self-sufficient, to absorb the energies

of the instructors and thus keep them away from farmers. In proportion as the farming operations of a school succeed and approach a grand scale, its products compete for a market with the products of private producers. Such competition has been known to create bitter antagonism on the part of farmers. Such competition tends to keep farmers away from the school.

The farming of a school is thankless. If it succeeds, the very common feeling is that it does so because back of it is "a barrel of public money." If now and then the school fails in a project, as the best

FIG. 282. — Inter-county school meet. Same boy that won cross-country run had won $\frac{1}{10}$th acre plowing contest judged by a practical farmer. Other contests included seed identification. Winner separated out and correctly named 49 out of the 50 varieties of grass and weed seeds that had been mixed together on a table. Essex County Agricultural School the host of this meet.

farmers themselves sometimes do, the very common feeling is that this is scandalous, — an inexcusable squandering of public funds. In almost any case, possession of land and live-stock by a school makes cordial coöperation with farmers exceedingly difficult.

Except as educator and farmer are able to unite for direct and immediate improvement in the farming of farmers, any system of agricultural education must be held to be futile, to be of no proper effect as an agency for the public good. All honor to any school with land and live-stock, therefore, if its operations are so ordered that its farming is a means to an end, not an end in itself; that farmers are not

alienated and kept away from the school with which they ought to be working; and that the instructors are not kept away from farmers with whom they ought to be working.

(3) **Model types of organization for teamwork. A. Vocational agricultural education and farm bureau work united in a county agricultural school.** — A model organization for teamwork with educators in the author's opinion has been found, as stated on page 193, in the Massachusetts type of county agricultural school with its combination of farm bureau work and vocational agricultural education, carried out by its staffs of short-distance men. The author believes that this type

FIG. 283. — Baseball game after haying. Bristol County Agricultural School.

of school is equally a model of organization for teamwork with farmers, particularly in its latest form in the county of Norfolk.

The author, as state supervisor, recommended, and the trustees of the Norfolk County School adopted, the policy of undertaking to keep the central school small, and to supplement its work at the central point by maintenance of one-teacher branches in high schools at the more distant points in the county. Sixty boys at the central school would warrant the employment of four instructors and make possible a degree of specialization in the staff. The short-distance boy is as much to be desired as is the short-distance educator. Sixty boys can be recruited within an easy-travel radius of the central school. The

outlying branches will provide for smaller groups of even shorter distance boys than many of those enrolled at the central school. All boys and instructors can be assembled at the central school on notable county occasions; and a building of the special arena designs shown in Fig. 236 has been provided for distinctively agricultural events, such as indoor demonstrations of animals, implements, or machines, judging contests, and even contests in athletics.

The central school and a branch in the Weymouth High School at the eastern end of Norfolk County were opened simultaneously.

FIG. 284. — Rope pull across the school pond. Inter-class annual event. Bristol County Agricultural School.

The Weymouth instructor is a member of the school staff and his salary is paid from the funds of the school. The school also provides all of his portable agricultural reference materials and equipment. The course of study of the central school is like that of the other separate and county schools shown above in Fig. 188. The course of study of the branch is like that of the high school agricultural departments shown above in Fig. 189. The Weymouth High School provides a library-laboratory study room and all necessary fixtures. It also provides the non-vocational half of the instruction. The Weymouth instructor, except in rare emergencies, represents the school in its farm bureau work with both children and adults. Other branches will be opened as needed.

FIG. 285. — George Freeman's trained steers. They did many other tricks. Trained them after supper, he said. Met all comers at fall fairs. Paid himself $2 a day, all expenses, and cleared $83 in prizes, fall of 1914. See also Figs. 139, 140, and 141. Now married and at home with his father. Trained center pair in 1913. Little chaps will be better workers because of their early training. Brimfield Agriculture Department.

The Norfolk County School has but little land and live-stock. Like the other separate and county schools, as elsewhere stated, it has no dormitory. It is more a service system than it is an institution. It is more a distributing agency than it is a monument. Between the school and farmers there is no barrier. It is finding that boys living and working on their home farms are real farmers, and that coöperation with their fathers is easy. It is finding that boys found a chance to live and work on farms in the vicinity of a school or department may also be real farmers throughout their courses, and that coöperation with the farmers with whom they live and for whom they work is not difficult.

Essex is an extremely compact county, hardly more than twenty miles across in any direction, and is a perfect network of steam and electric railway lines. Need for outlying branches is less felt in this county and such branches may not be established. That its work and farming are united may be inferred from the chart showing its activities and relationships printed above as Fig. 262.

Bristol is a shoe-string county, long and narrow. The school has before it a petition to take over as a branch the agricultural department in the high school at North Easton which was established in the extreme northern end of the county before the school was opened at the center. There may be need of four branches to complete a well-balanced, short-distance service system in this county. Meantime this school has both land and live-stock, and yet is able to work well with a gradually growing number of farmers.

The field of vocational agricultural education is the field *par excellence* of short-range service. Its organization should not be that of an agricultural college. Its organization should be for work by short-distance men with short-distance farmers, primarily, including both boys and men; and, incidentally, for similar short-range service with families that have land or live-stock, though perhaps not very much, which they desire to make contribute to their support.

**B. A service system, without publicly owned land or live-stock,** in which high school agricultural department work and farm bureau work are unified and harmonized in one office for each county is worth a trial. The author hopes and believes that such an organization may

Pillory. Smith School boys.

Going to church. Townspeople.

Drunkard's punishment. Smith School boy.

FIG. 286. — Glimpses of the Northampton pageant attended by thousands. Smith College presented it. Delightful form

Stocks. Smith School boys.

Morris dance. Smith School boys and girls.

Indian chief's song to the Great Spirit. Smith College professor.

and Smith Agricultural School faculties and students and townspeople, high and low, of community recreation.

sometime be developed in the other counties, an organization for teamwork where the short-range service of each will center in an office as headquarters, instead of on a county school farm, where the service will be distributed through the carefully unified and harmonized labors of middle-distance county agricultural agents and short-distance vocational instructors in high school agricultural departments, and where the work will be done with farmers and families wholly on land privately owned and controlled.

(4) **Fight for service, not for leadership** — Too often new movements in education are launched in utter disregard for previous accomplishments and present agencies. An agricultural college president may alienate not a few who ought to be his closest co-workers by coming into a state with a conception and a program preconceived which appear to assume that either nothing has before been done of value or importance in the general agricultural education of the state, or that what has been done has been done badly or by the wrong people. A farm bureau may solicit support in utter disregard of local agencies for doing some of the things the farm bureau proposes to do. Such mistakes have been made. The besetting sin in such cases is the battle for leadership.

The situation becomes but the more difficult, if, as generally happens, the dominant note of the would-be leader is that of the uplifter. Mr. Roosevelt [1] has expressed the instinctive attitude in which most decent people find themselves when confronted by such a person.

"There are few more irritating companions," he says, "than the self-conscious uplifter. The way to help others is to join with them in some form of effort or expression to which all contribute for the good of all. Only thus can we foster the two homely virtues which lie at the bottom of what is best in Americanism — self-respect and mutuality of respect."

Vocational agricultural education should no more be vitiated by the taint of the uplifter, than should be kindergarten education or any other phase of education for normally, gradually developing young people. Ours is not a slumming job. It calls, not for preachers, but for teachers; not for reform so much as for constructive service.

[1] *Metropolitan*, April, 1918, p. 8.

And in the lifelong educational process, adults are but young people grown a little older. Moreover, education, in the nature of the case, calls for division of labor. In fact, civilization has been the achievement of a multitude of educational agencies, — so many that to name them would be to catalogue most of the activities of any hour or year, of any locality or nation.

In the author's judgment, the state supervisor, local director, and superintendent ought here to be well warned. Just as in intramural

FIG. 287. — "Appreciation" through interpretation. English classrooms may be transformed from torture chambers into places of delight by presentation of plays. Some of Miss Metcalf's pupils who played "Hymen," "Rosalind," and "Celia." Smith School, Northampton.

activities they require the instructor to make a preliminary survey of the home farm of the boy and win the coöperation of the parent prior to admitting that boy to his class, so there ought to be a survey of the educational agencies of a state, of a county and of a locality prior to launching the first extramural activities of a school or of a department. Then every effort ought to be made to work with and through those agencies. The author reprints above in Fig. 261 a diagram which, in and of itself, well entitles the West Virginia institution it represents to claim for its slogan the motto, " I serve."

Similar in spirit is the chart in Fig. 262, before referred to, in which are set forth the activities of a vocational agricultural school in Massachusetts. The three self-explanatory charts in Figures 263, 264, and 265 will richly reward study and efforts in the direction they indicate.

Fine examples of service are all about us. Three or four examples may serve to illustrate responses to calls for extramural activity.

Here is an instance of a response by the superintendent of schools in the city of North Adams, which maintains an itinerant vocational agricultural instructor. Note how he signs this newspaper announcement. Note, also, that there is no hint that the school department is to be paramount.

"**Preliminary Announcement**

"The food administration has created a Food Production and Conservation Committee in each city and town of our commonwealth as a wartime emergency measure. It is the business of this committee to stimulate, encourage, advise, direct, and otherwise assist our citizens in divers ways and places and at various times, to greatly increase the home production and conservation of foods.

* * * * * * *

It is our expectation and earnest desire to be of real assistance and to fully justify our existence as a committee:

*First* — By organizing, directing, and supervising garden areas in various parts of the city on a community or group basis.

*Second* — By encouraging individual gardens and stimulating individual farmers.

*Third* — By coöperation with school garden projects.

*Fourth* — By providing fertilizers and tested seeds at cost.

*Fifth* — By providing in this department timely information, garden hints, conservation notes, U. S. Department of Agriculture leaflets edited and arranged to meet local conditions, and a question box.

*Sixth* — By arranging local meetings for food and garden talks.

*Seventh* — By proper attention to spraying fruit and vegetables.

*Eighth* — By providing a community kitchen under skilled supervision where surplus or purchased products may be preserved for individuals at a small cost for service.

*Ninth* — By providing some type of public market or exchange for surplus food products.

*Tenth* — By coöperating with all other committees or agencies for public welfare.

**Efficiency Record for Month Ending ——**

| | Perfect Score | |
|---|---|---|
| | Winter | Summer |
| I. Department — Administration | 25 | 50 |
| A. Business Management | 10 | 20 |
| 1. Pupils — punctual, industrious, effective | | |
| 2. Tools and equipment — care, condition | | |
| 3. Production — plans, condition | | |
| 4. Marketing | | |
| 5. Finance — expenditures, economy, results | | |
| B. Neatness | 5 | 10 |
| 1. Orderliness | | |
| 2. Cleanliness | | |
| 3. Buildings and equipment at their best? | | |
| C. As Laboratory for Instruction | 10 | 20 |
| 1. Approved methods and practices | | |
| 2. Equipment adequate but not elaborate | | |
| 3. Laboratory assignments well carried out | | |
| II. Classroom | 50 | |
| A. Condition | 5 | |
| B. Facilities for teaching | 10 | |
| 1. Laboratory materials | | |
| 2. Illustrative materials | | |
| 3. Decorations | | |
| C. Enrollment | 5 | |
| D. Attendance | 5 | |
| E. Discipline | 10 | |
| F. Instruction | 15 | |
| III. Home Projects | 25 | 50 |
| A. Plans | 5 | 10 |
| B. Supervision | 5 | 10 |
| C. Records | 5 | 10 |
| D. Products, etc. | 10 | 20 |
| | 100 | 100 |

NOTE. Score about weekly, publish monthly.

FIG. 288. — Separate and County schools in Massachusetts are organized departmentally. Director Gilbert of Bristol County School uses the above form of score card in his weekly supervision of departments. He posts the score of each department, or makes it the basis of personal commendation or reproof. The author has seen no better aid to efficient supervision than this.

We shall have a place for much volunteer service, so do not wait to be asked. We shall welcome suggestions. We shall strive diligently to have our efforts carry over into results sufficiently to cause this movement to gain momentum as the weeks pass. It is our expectation that when we strike our balance this next fall, it will be evident that North Adams has been very much more self-supporting than previously, that our people have accumulated a cellar food supply in excess of other years, and that we have through it all helped defeat the greedy Hun.

BURR J. MERRIAM,
March 20, 1918. For the Committee."

Following is an example of the very exacting scientific service an instructor may be able to render. Mr. Swett is vocational agricultural instructor in Newton, and this report was to the Newton Committee on Public Safety on a bit of emergency service.

**" Report on Inspection for the European Corn Borer**

(Pyrausta Nubilalis Hübner)

" During the week of April 22 to 27, I personally examined over 1000 specimens of corn stubble, standing corn, and stalks piled in gardens.

These inspections were made in Newton, Nonantum, Newtonville, West Newton, Auburndale, Lower Falls, Upper Falls, Waban, Newton Highlands, and Newton Center. Also in the outside cities of Watertown, Waltham, Weston, Cochituate, and Framingham.

As I am personally familiar with the appearance of this borer, I feel sure that, as the result of my examinations was entirely negative, it may be safely taken for granted that the above-named cities are free from this pest.

Respectfully submitted,
RAYMOND W. SWETT."

April 27, 1918.

No less interesting is the following example of the unpaid public service an instructor may render, and of the posts of honor and responsibility he may be invited to fill. This is the unsigned report dated April 12, 1918, of Mr. A. W. Doolittle, head of the two-teacher vocational agricultural department in Concord High School, who is serving as chairman of the Food Production Committee of the town of Concord.

" 1. Attended meeting of County Food Supervisors at the State House February 1.

2. Corresponded with the National and State Food Administrations in regard to the order prohibiting the farmer from mixing feed wheat in poultry rations, and secured a modification of the same.

3. Sent two circular letters to farmers giving poultry ration.

4. Sent two circular letters to the farmers in regard to importance of testing seed corn.

5. Purchased a bushel of shelled field corn for seed for the farmers.

6. Sent letters to churches, lodges, clubs, and factories, on the necessity of food production.

Name Sheehan, David — Concord Farm Survey
Taken 1/9/16 Acreage 212
Address Main Street — Revised 5/1/18
Stock: Horses 6 Cows 25 (7 young) Jr. Holstein Bull Reg Holstein Swine 3
Hay Land 65 a. Grain Field Corn 8 a. Potatoes 16 a.
Alfalfa Sows in hay Asparagus 12 a.
Strawberries ✓ Other small fruits ✓
Poultry Hens Breed
Apples: Bearing trees 200 - Baldwin - Gravenstein - Mc Intosh Wolf River
Young trees 100 - Baldwin - Gravenstein - Wagoner
Peaches ✓ Pears 40 - Bartlett - Sheldon Plums Cherries
Market Garden Crops:
20 a. Sweet Corn 4 a. Cabbage 3 a. White Turnip
3 a. Cauliflower 2 a Squash
Greenhouses ✓ Buildings Fine Silo Yes Machinery
Remarks: Has good buildings, modern machinery and is good, progressive farmer

FIG. 289. — Card used by Agricultural Instructor Doolittle in surveying and resurveying farms. He has 110 farms in and about Concord listed in this manner. Size 4" × 6".

7. Arranged for prices on fertilizers with the local dealers, and also arranged for them to handle the same directly for the war gardeners in town, instead of having it handled directly by the Committee as it was last year.

8. Circular distributed on the use of the water glass, and advising people to buy eggs and put them down in the same.

9. A list of reliable varieties of vegetables distributed to the people in town.

10. A ton of arsenate of lead purchased to be sold to the farmers.

11. Bordeaux mixture purchased to be sold to war gardeners.

12. 1500 bulletins on gardening distributed.

13. 1500 circulars on food conservation distributed.

14. 1000 circulars on the value of milk distributed.

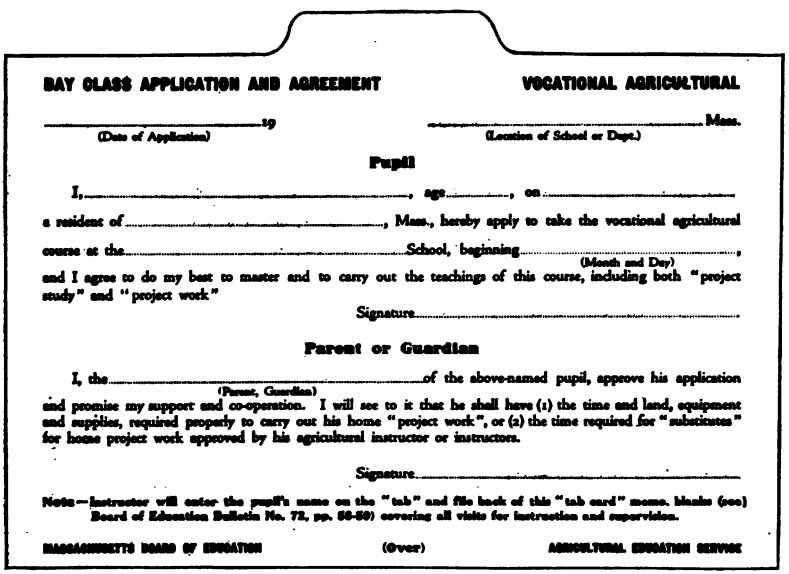
15. 1000 circulars on growing seeds distributed.

16. Farm survey conducted of all the farms in town, and showed a decrease of 150 acres over last year's planting, also that 75 boys were wanted in the camp.

17. Circular letters with bulletin sent to farmers urging the growing of vegetable seeds.

18. 500 pounds of arsenate of lead purchased to be sold to war gardeners."

And, as a fourth example, the following report may be of interest as showing how even a young instructor at the beginning of only



DAY CLASS APPLICATION AND AGREEMENT — VOCATIONAL AGRICULTURAL

_____ 19 _____ Mass.
(Date of Application) (Location of School or Dept.)

Pupil

I, _____, age _____, on _____

a resident of _____, Mass., hereby apply to take the vocational agricultural course at the _____ School, beginning _____ (Month and Day),

and I agree to do my best to master and to carry out the teachings of this course, including both "project study" and "project work"

Signature _____

Parent or Guardian

I, the _____ (Parent, Guardian) of the above-named pupil, approve his application and promise my support and co-operation. I will see to it that he shall have (1) the time and land, equipment and supplies, required properly to carry out his home "project work", or (2) the time required for "substitutes" for home project work approved by his agricultural instructor or instructors.

Signature _____

Note—Instructor will enter the pupil's name on the "tab" and file back of this "tab card" memo. blanks (see) Board of Education Bulletin No. 72, pp. 86-89) covering all visits for instruction and supervision.

MASSACHUSETTS BOARD OF EDUCATION (Over) AGRICULTURAL EDUCATION SERVICE

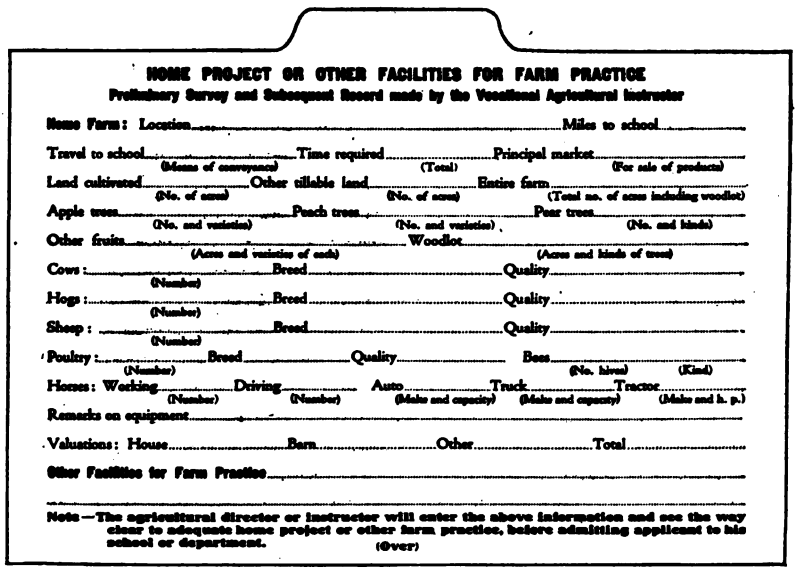
FIG. 290.—Front of day class application and agreement blank used as an enrollment card, and also as a tab-card for filing the instruction and supervision memorandum blanks like that shown in Fig. 303. Color, blue. Size 4″ × 6″.

the second season of service may promptly grasp the ideals of coöperative effort, and help to bring all of the educational factors which, in a given locality, ought to be at work, into good working relations. Withal there are in it a commendable local pride and an enthusiastic spirit. This is a report of a vocational agricultural instructor whose work last year was primarily with adults and wholly itinerant.

This report is from a town in Essex County, was made in May, 1918, and reads as follows:

"I have been thinking for the last few days that it would be well for me to give you a summary of our food production work here in Saugus, in order that you may know where I have been expending my time and effort.

The food production committee here is an excellent one. I have met them at every meeting, and jointly we have accomplished the following for farmers and adult home gardeners. Although we have had no appropriated funds,



**HOME PROJECT OR OTHER FACILITIES FOR FARM PRACTICE**

**Preliminary Survey and Subsequent Record made by the Vocational Agricultural Instructor**

**Home Farm:** Location ..... Miles to school .....

Travel to school ..... (Means of conveyance) Time required ..... (Total) Principal market ..... (For sale of products)

Land cultivated ..... (No. of acres) Other tillable land ..... (No. of acres) Entire farm ..... (Total no. of acres including woodlot)

Apple trees ..... (No. and varieties) Peach trees ..... (No. and varieties) Pear trees ..... (No. and kinds)

Other fruits ..... (Acres and varieties of each) Woodlot ..... (Acres and kinds of trees)

Cows: ..... (Number) Breed ..... Quality .....

Hogs: ..... (Number) Breed ..... Quality .....

Sheep: ..... (Number) Breed ..... Quality .....

Poultry: ..... (Number) Breed ..... Quality ..... Bees ..... (No. hives) (Kind)

Horses: Working ..... (Number) Driving ..... (Number) Auto ..... (Make and capacity) Truck ..... (Make and capacity) Tractor ..... (Make and h. p.)

Remarks on equipment .....

Valuations: House ..... Barn ..... Other ..... Total .....

**Other Facilities for Farm Practice** .....

**Note—The agricultural director or instructor will enter the above information and see the way clear to adequate home project or other farm practice, before admitting applicant to his school or department.**

(Over)

FIG. 291. — Back of day class enrollment card shown in Fig. 290. Note memorandum for data on home farm or other facilities for farm practice.

much has been accomplished by a "cash deposit in advance method," the town treasurer handling all the money.

We have purchased and delivered 600 bushels seed potatoes, 20 tons 4-10-0 fertilizer, 33 tons ground limestone, 10 tons wheat middlings, and we are in the process of handling 2000 pounds nitrate of soda and 160 pigs.

There has been an immense amount of detail work connected with this getting of agricultural supplies and it has occupied a large part of my time. About half the pigs have been delivered. The nitrate has not yet arrived.

Realizing that the greater part of my time must be given to adults, I have devised the following plan for taking care of school pupils' gardens.

| Name of Pupil | Residence | Miles to School | Home Farm | |
|---|---|---|---|---|
| | | | Land | Buildings |
| Chester E. Cole | Berlin | 5 | 101 acres (20 wood) | House $2,800<br>Barn 1,500<br>Miscellaneous 1,000 |
| Ernest B. Coulson | Berlin | 5 | 33 acres (all tillage) | House $3,500<br>Barn 1,000<br>Miscellaneous 250 |
| Albert B. Cutler | Boylston | 5 | 68 acres (all tillage) | House $2,000<br>Barn 1,000<br>Miscellaneous 200 |
| Andrew C. Fitch | Sterling | 2½ | 300 acres | House $5,000<br>Barns 4,000<br>Miscellaneous 1,000 |
| Robert McRell | Lancaster | ¾ | ¼ acre | House $2,500<br>Miscellaneous 300 |
| Douglas J. Hayes | Lancaster | 1½ | 90 acres in Princeton; ½ acre in Lancaster | House $2,000<br>Miscellaneous 200 |
| Nelson E. Taylor | Berlin | 5 | 2½ acres | House $1,500<br>Miscellaneous 500 |
| Clifford H. Wheeler | Berlin | 5½ | 25 acres (16 tillage, 9 wood) | House $3,000<br>Barn, etc. 1,000 |
| Norman Hall | Pratt's Jct., Sterling | 4½ | 400 acres (50 wood) | Houses $9,000<br>Barns 5,000<br>Miscellaneous 1,000 |

Fig. 292.—Vocational agricultural

Applicants must show that they have land and equipment for home projects prior to approved farms, are sometimes

The school committee have allowed me funds to prepare for planting 50,000 feet of centrally located land.

Twenty Junior High School pupils averaging 14 years have elected to take $\frac{1}{10}$ acre of this land each. In return for what the school committee have furnished them, these twenty agree to act as inspectors of the junior gardens in their respective localities.

As soon as I get these inspectors' gardens well under way, they in turn will supervise and inspect all junior school home gardens, relieving me of same.

| Live-stock | | | | Fruit Trees | Remarks on Equipment |
|---|---|---|---|---|---|
| Horses | Cattle | Poultry | Hogs | | |
| 2 | 9 | 150 hens | 1 | 200 apple . . . | All modern farm tools |
| — | 5 | 40 hens | — | 12 apple . . . | All farm tools |
| 3 | 46 | 70 hens | 12 | 75 apple . . . | All farm tools |
| 12 | 50 | 200 hens | 11 | 500 apple and pear | New silo. All modern farm tools |
| — | — | 100 hens | — | 20 apple and pear | Small place. (Has very good garden) |
| — | — | 100 | — | 15 apple . . . | Small home place. Father works on large farm |
| — | — | 50 | 1 | 25 apple and pear | Small place. (Boy works on neighboring farm) |
| 1 horse 3 steers | 4 | 175 hens 5 ducks 9 guineas | 12 | 130 apple and pear | All farm tools. (Boy works in greenhouses near by) |
| 9 | 150 | 500 | — | 100 apple . . . | A fine dairy farm. Large silo |

instructor's preliminary survey. (*Continued* on pp. 394–395.)

approval of their admission. Substitutes for home projects, such as employment on accepted. See pages 353 and 398.

Through these inspectors I can, however, oversee the junior work with little effort.

Superintendent Flood believes the twenty inspectors are the nucleus of a permanent High School Agricultural Department.

Pupils of the age mentioned seem to be most responsive. The response from older pupils is poor. Other lines of work seem to them easier, better paying, and more respectable. I hope to demonstrate with the twenty boys and girls that no vocation can beat agriculture and swing them into line for the

| Name of Pupil | Residence | Miles to School | Home Farm | |
|---|---|---|---|---|
| | | | Land | Buildings |
| Eugene A. Popp | Bolton | 2 | 23 acres (all tillage) | House $1,000<br>Barns 300 |
| John Schutz | Bolton | 2 | 117 acres (25 wood) | House $3,000<br>Barns 1,000<br>Miscellaneous 300 |
| Henry Stedman | Clinton | 1 | 42 acres (2 wood) | House $4,000<br>Miscellaneous 100 |
| Richard Tucker | Sterling | 4 | 62 acres (20 tillage, 42 wood) | House [1] $4,000<br>Barn [1] 1,500 |
| Royall W. Tyler | Sterling | 3½ | 100 acres (40 tillage 60 wood) | Houses { $3,000<br>2,000<br>Barn 1,000 |
| Henry G. Wendler | Clinton | 1 | 15 acres (8 wood, 7 tillage) | House $3,500<br>Barn 1,000<br>Miscellaneous 500 |
| Harold E. Wiles | Sterling | 2½ | 70 acres (estimated) | House $2,000<br>Barn 1,000<br>Miscellaneous 200 |
| Leslie Murray | Sterling | 6 | 120 acres (75 tillage, 45 wood) | House $2,500<br>Barn 1,500<br>Miscellaneous 500 |
| Mario C. Pedroli | Clinton | ½ | ¼ acre | House $1,500<br>Barn 500 |
| George F. Duggan | West Berlin | 2 | 60 acres (estimated) | — |

Fig. 292. (*Continued*

department before other lines divert their attention.

I have a group of adult gardeners meeting each week. The County School [2] has furnished special lecturers for some of these meetings. Mr. Gaskill [3] has been of great assistance also.

Early in the season three large public meetings in the interest of food production were held. The production committee furnished the hall and I sup-

[1] All new.

[2] Essex County Agricultural School.

[3] Agricultural County Agent of the Essex County School.

| Live-stock | | | | Fruit Trees | Remarks on Equipment |
|---|---|---|---|---|---|
| Horses | Cattle | Poultry | Hogs | | |
| 1 | 6 | 60 | 2 | 50 apple . . . | A small market-garden place |
| 3 | 8 | 350 | 20 | 50 apple . . . | These people have recently taken this farm. |
| — | — | 42 | — | 25 pear and apple | A large farm, but not worked at present. |
| 1 | — | 40 | — | 150 apple . . . | Starting a fruit farm. (A good location) |
| 2 | 2 | 70 | 1 | 1,000 apple . . | Fruit farm. (Very good location) |
| 1 | 2 | 125 | 2 | 75 apple . . . | A very good market-garden place |
| 4 | 10 | 100 | 2 | 40 apple . . . | A large hillside farm |
| 4 | 35 | 135 | 2 | 250 peach, 50 apple, 25 miscellaneous . . | A large dairy farm |
| 2 | — | 30 | 2 | 6 apple and pear | Small town place |
| | — | — | — | 50 apple . . . | Farm owned by Clinton milk man |

from pp. 392–393.)

plied the speakers, including farm bureau and agricultural college specialists.

Now that the work of creating enthusiasm in food production and the securing of supplies is easing up, I shall give my attention to itinerant work with home gardeners and farmers, will get my file [1] in good shape and consolidate my efforts to a definite number.

Our business relations with Mr. S. N. Stimson, the Farmer's Coöperative Association [2] manager, have been very pleasant.

[1] File of project instruction and supervision memo's.

[2] Essex County Coöperative Farming Association, doing a business of over $10,000 a month.

If you plan a tour [1] such as we had last year, I hope you can visit Saugus. We have adult gardening projects of interest, the junior inspectors' plot I have mentioned, a three and one-half acre greenhouse and twenty-five-acre field plant managed by William Sim, champion violet grower of the world; and we

Where cranberries thrive.

Propagation and fruiting.

Three essentials: Plenty of water under quick control, bog, and sand.

FIG. 293. — There is now and then a home project in cranberry growing. The Massachusetts cranberry crop from scattered bogs in the area above shown sells for more than a million dollars a year. The above photographs were published by the United Cape Cod Cranberry Company, whose bulletins are valuable aids to the study of cranberry growing, harvesting, storing, and marketing. Each boy's needs should be studied and the work he needs most should be outlined for him, even though the conditions he must meet may be radically different from those of other members of his class. Responsibility for teaching projects in such specialized fields should not be shirked.

have one of the best five-acre, seven-year-old apple orchards in the county owned by Walter Penney.

The feeling here is growing in favor of agricultural undertakings and we would certainly feel honored by a visit.

I am

Yours very truly,

ELLERY E. METCALF."

[1] This is a reference to the "Conference on Wheels" above described.

This instructor is a young farmer who lives in the town he is serving. During the crop-growing season of 1917 he was on salary. But when his salary stopped, there was no interruption of service. This will be evidenced by the following report on his unpaid work during the winter.

"At the close of my salaried work in November, 1917, I sent names and addresses of seventy home gardeners and farmers to L. Wayne Arny, Supervisor of Correspondence Courses, Massachusetts Agricultural College.

These seventy were persons who had evidenced the greatest interest in my itinerant visits and seemed capable of more intensive study. Mr. Arny sent them each a list of courses, came to Saugus himself, and together we organized a group-study class with the privilege of using a room in the high school each Thursday evening.

Twenty took the course in "Vegetable Gardening"; ten, "Soils and Soil Improvement"; and seven, "Manures and Fertilizers."

I was elected group leader, and I appointed a secretary for each of the three courses who received the lessons and gave them to me to forward to M. A. C. I took the "Market Gardening" course and conducted a discussion on each lesson in that course, and also assisted the secretaries of the other two courses in discussions for their groups. We had M. A. C. lecturers address the group. When the coal shortage came we met at members' houses. Finally we secured the use of the court room in town hall.

In February we invited Mr. Gaskill, County Agent, to speak to us on collective buying — he gave us prices on car lots. This was too big a proposition for the class to handle so I met the selectmen, asking that a production committee be appointed and all townspeople invited to buy collectively with the class. The selectmen published Mr. Gaskill's prices and appointed a town production committee of three from the study class to take charge in conjunction with me of getting the supplies. As a town committee they called upon the town treasurer to handle all money. There were no appropriated funds to use, so everything was cash deposited in advance, applicant receiving a town receipt with stub attached, stub to be presented to deliverer of supplies. I attended to checking up the supplies as they came in and to directing delivery of same, following up complaints, etc. Through the County Agent we did our business with Mr. S. N. Stimson, Manager of the Essex County Coöperative Farming Association. I personally am taking charge of getting 2000 pounds of the government nitrate. Supplies to the amount I stated in my other letter were handled, and the meetings I mentioned conducted shortly after the production committee was appointed.

The production campaign was, you see, well under way at the time I again took up my salaried duties.

I continually kept the local school authorities acquainted with all my plans and made them the controlling influence.

Mr. C. L. Smith, chairman of the production committee, is principal of our high school; he has allowed the commercial department to be of great assistance to me and to the committee. The pupils volunteered their assistance. We have laid great stress on the importance of patriotic coöperation of town officials and townspeople. . . ."

If there must be a fight, in short, let it be a fight, not for leadership, but for service. First, where there is day class instruction, there must be work with growing boys. Since this work, as a rule, includes work at their homes, the service of the vocational agricultural school naturally overflows into and through the community. Let us, therefore, say to our agricultural instructors: Forget leadership. Forget uplift. Be yourself a good follower of the best that has been thought and said and done in the agricultural world. Then, let your labors be like a spring, labors welling up through your growing boys, and others whom you teach, and steadily overflowing, not to flood nor to efface, but through pleasantly plotted channels like fresh waters in a thirsty land.

## CHAPTER VIII

### SUGGESTIONS TO VOCATIONAL AGRICULTURAL INSTRUCTORS

THE author hopes that any vocational agricultural instructor who may be inclined to consider the suggestions in this chapter will first run over the suggestions offered supervisors, directors, and superintendents in the previous chapter. The present chapter, moreover, presupposes familiarity with details of the entire discussion in the foregoing pages.

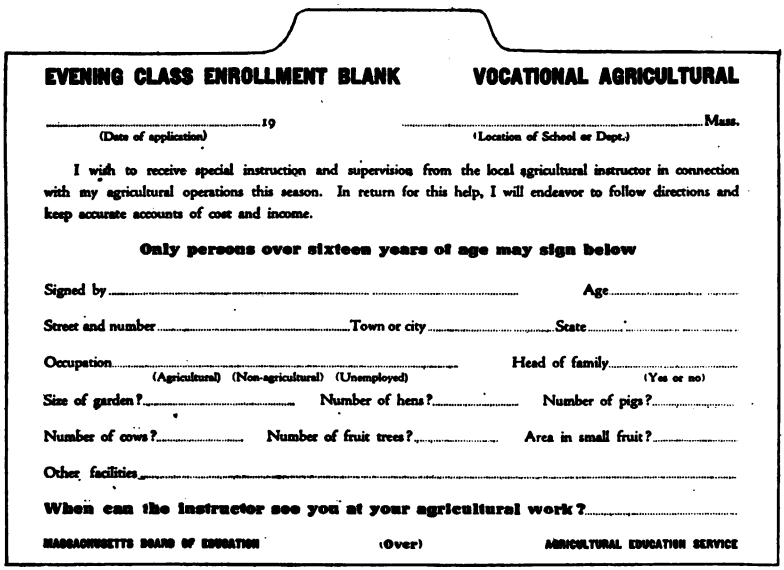
#### 1. Make Educational Surveys

As soon as may be, acquaint yourself with all of the educational agencies in your state, your county, and your locality with whom you ought to work or by whom you may rightly hope to be helped. For efforts in this direction you may justly claim "professional improvement" credit. By this means you may prevent needless or unpleasant duplication of effort, and open up avenues for the constant enrichment of your service.

#### 2. Make Surveys of Farming

Prior to admitting pupils to your classes, make preliminary surveys of the farms on which they live and expect to work. Use some such guide as that shown above in Fig. 291. Extend your preliminary survey to farms where there is a shortage of labor, where good methods are followed and where you may hope to secure employment for the occasional boys who are not from farm homes or who cannot live at home during their agricultural courses. Extend further your study of farms until you have in your card index a complete file of data on the farming resources and activities of your locality. A suggestive guide to such a complete survey may be found in the example of a survey card shown in Fig. 289. Surveys which naturally lead

to re-surveying may be "farm management" surveys in which help may be had from, and given to, the farm management expert of the State College of Agriculture. Individual instructors in Massachusetts



**EVENING CLASS ENROLLMENT BLANK** **VOCATIONAL AGRICULTURAL**

.....19 .....Mass.
(Date of application) (Location of School or Dept.)

I wish to receive special instruction and supervision from the local agricultural instructor in connection with my agricultural operations this season. In return for this help, I will endeavor to follow directions and keep accurate accounts of cost and income.

**Only persons over sixteen years of age may sign below**

Signed by..... Age.....

Street and number.....Town or city.....State.....

Occupation..... Head of family.....
(Agricultural) (Non-agricultural) (Unemployed) (Yes or no)

Size of garden?..... Number of hens?..... Number of pigs?.....

Number of cows?..... Number of fruit trees?..... Area in small fruit?.....

Other facilities.....

**When can the instructor see you at your agricultural work?**.....

MASSACHUSETTS BOARD OF EDUCATION (Over) AGRICULTURAL EDUCATION SERVICE

FIG. 294. — Front of blank used for enrollment of those not able to attend day classes. Instruction may be given, and generally is given, before dark; and on the itinerant, individual, or family group, home to home plan. Note data on facilities for farming, gardening, etc. Note, also, that the application is supported by an agreement. Color, buff. Size 4" x 6".

have made forty or more such surveys as those last named in a year, and followed them up with subsequent surveys. For this work they have been given "professional improvement" credit.

### 3. Require Preliminary Project Agreements

Of fundamental importance is it to provide for farm work to be done throughout the period of training of each pupil.

There is considerable speculation as to why farm boys leave home, sometimes to work on other farms, but, also, perhaps more often, to work in cities. The author has heard more than one successful farmer

say that he stuck to farming in spite of his father and not because of his father's encouragement. An anonymous writer has put into

**FINAL SUMMARY OF ACCOUNTING OF EVENING CLASS PROJECT OR PROJECTS**

**Actual—Estimated**
(Erase one)

| RECEIPTS | | | EXPENSES | | |
|---|---|---|---|---|---|
| Value of products sold for cash or exchanged | | | Labor (hired) | | |
| | | | Seed | | |
| | | | Fertilizer | | |
| Estimated value of vegetables used or stored | | | Spraying Mixtures | | |
| | | | Rent (if rented) | | |
| | | | Other expenses | | |
| TOTAL | | | TOTAL | | |

Number of hours (approximately) spent on this project?

**Notes**—Instructor will see that simple records are kept from which the above summary at the end of the season can be entered by him.

Instructor will enter the pupil's name on the "tab" and file back of this "tab card" memo. blanks (see Board of Education Bulletin No. 72, pp. 86-89) covering all visits for instruction and supervision.

(Over)

FIG. 295. — Back of enrollment blank used for those not in day classes. Many employed in non-agricultural pursuits use their out-of-work hours for home-gardening and poultry keeping. But even such persons are expected to study expenses and returns as suggested above. This is used as a tab-card for the instruction and supervision memoranda.

rime, of which the following lines are part, the answer of a boy in a city as to why he left the old homestead:

"I left my dad, his farm, his plow,
Because my calf became his cow;
I left my dad — 'twas wrong, of course —
Because my colt became his horse.
I left my dad to sow and reap
Because my lamb became his sheep.
I dropped my hoe and stuck my fork,
Because my pig became his pork.
The garden truck that I made grow,
'Twas his to sell, but mine to hoe.
It's not the smoke in the atmosphere,
Nor the taste for life that brought me here;

Please tell the platform, pulpit, press,
No fear of toil or love of dress
Is driving off the farmer lads,
But just the method of their dads."

It cannot be doubted that property rights, on at least a modest scale, are immense aids to interest and earnest endeavor in home-project work. Most boys will give most of their time to farm work for their fathers, and do it ungrudgingly, if only they can now and then feel that they can earn something which shall be peculiarly their own. Home projects propose property rights for the pupil. The home garden may be rented or owned the first year; a pen of poultry, a pen of pigs, and one hive or more of bees, with a limited amount of land for cropping, the second; part of the orchard and land for a cash crop, the third; and one or more cows, with land for one or more crops, the fourth.

Responsibility proportionate to such property rights should, of course, be assumed by the pupil and be shared by his instructor.

Though school control may sometimes be slightly modified by home control, all misunderstanding may be avoided and preparation for good results may be made by a joint agreement in advance for each year in succession, in which interests are harmonized and responsibilities fixed. A form of agreement which may be suggestive is shown above in Fig. 290.

The author feels that he cannot too strongly urge you to admit no pupil to your class until you have visited his home, interviewed both him and his parents or guardian, or his employer, and brought about arrangements by which, from the outset, he shall do farm work at his home or elsewhere, coincident with his study, and shall do it in accordance with the methods which you teach or which you are willing to approve for a limited trial.

(1) **Suit project agreements to conditions.** — The success of an agricultural course in which the home-project plan is followed will depend upon the tact and common sense of the instructor, and his ability to draw up preliminary agreements which shall hold, not so much by virtue of their formality, legality, or moral obligations, as through the thorough understanding of requirements and contem-

## FIRST YEAR CLASS — ELEMENTARY AGRICULTURE AND KITCHEN GARDEN

| SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | |
|---|---|---|---|---|---|---|---|---|---|---|
| Elementary survey of the affairs of agriculture<br>Study of the nature and sources of plant food | The soil — nature, origin, composition, water in, air in, bacteria in<br>Making potential plant food available | Barnyard manure — Complete study of maintenance of fertility on the farm<br>Study of commercial fertilizers | Farm plants — nature of, classification of, dissemination and multiplication of | The farm garden<br>Use of hotbeds and cold frames<br>Location and soil<br>Planning the garden<br>Seeds and plants<br>Preparation of soil<br>The seed bed<br>The handling of plants<br>Time of planting | | Cultural study of the important garden crops<br>Study of (and frequent drills) insects and diseases of garden crops<br>Study of common weeds | The improvement of plants, study of | THEORY |
| Observation trips to see gardens of boys in course previous year<br>Discussion of size, kinds of vegetables, amount of vegetables, insects, plant diseases<br>Study of garden crops — harvesting, marketing, and storing<br>Selection for exhibits<br>Classification, judging, and scoring for market use<br>Seed selection, systems of | Wide range of varieties of each vegetable brought to schoolroom by pupils | Observation trips to farms to study soils and topography<br>Use of soil auger<br>Geological details observed and explained<br>Garden sites for next year selected by each pupil with advice of instructor<br>Samples of soil from garden site secured and brought to school | Soil samples from garden sites classified and studied<br>Hotbeds — construction studied and discussed<br>Each pupil required to construct hotbed at home for use in February<br>Experiments in laboratory on phases of soil study such as capillary action in soil, effect of mulch, etc. | Study and handling of the common commercial fertilizers to familiarize each pupil with their appearance and respective analyses | Seeds of bean and corn sprouted in classroom and studied botanically<br>Study of common garden seeds<br>Each student required to become thoroughly familiar with all<br>Garden plans constructed by each pupil for coming season | Study of garden tools and use of<br>Exercises in construction of, and use of, dibbers, markers, trellises for tomatoes, and other simple garden tools and structures | | Observation and study of injurious insects and plant diseases<br>Methods of control | Study of common weeds — identification, methods of eradication, etc. | LABORATORY OR PRACTICAL WORK |

FIG. 296. — Seasonal Plan of Kitchen Gardening Course. The first response to the call of the state supervisor for presentation of such plans for preliminary approval. Prepared by Mr. C. E. Lee, then of Concord, Mass.

## SEASONAL PLAN FOR POULTRY COURSE

| Mon. | September | October | November | December | January | February |
|---|---|---|---|---|---|---|
| Class-work in theory of poultry craft — Div. | 1. Poultry farming and what it means<br>2. Choosing a farm<br>3. Making a successful start<br>4. Breeds of poultry<br>5. Selection of stock | 15. Management of laying stock<br>6–7. Poultry-house construction<br>8. Equipment of poultry-house<br>9. Yards and yarding | 23. Roasters<br>15. Winter-management of laying stock<br>17. Anatomy and physiology of the fowl<br>10. Principles of poultry feeding<br>27. Exhibiting — judging | 11. Feedstuffs<br>12. Practice of poultry feeding<br><br>Vacation Period | **Breeding and Incubation**<br>13. Principles<br>14. Practice<br>16. Management of stock | 18. Formation of egg and chicken<br>20. Artificial incubation |
| Laboratory practice | Visit several poultry farms Chapin Tompkins<br>Visit farms to study breeds<br>Score some local poultry farms<br>Study and copy some poultry-house plans<br>Build hoppers<br>Dry mash, grit, and shell | Visit farms to study type of houses, construction, equipment, yards, etc., or build or remodel house for student<br>Draw plans of some local man's laying houses; estimate cost<br>Make plans and estimates of own house | Killing roasters and fowl<br>Study anatomy of a hen<br>Mix disinfectants and study spray pumps<br>Use permanganate of potash<br>Judging birds at Tompkins' farm | Mix rations<br>Calculate and compare cost of commercial and home-mixed rations<br>Study various feeds and commercial mixtures<br>Study grading eggs and prepare for market | Poultry show<br>Study breeds and equipment<br>Each pupil compare good birds of his breed with those of others | Run small incubator to test fertility of eggs and study development of the chick during incubation<br>Study mammoth incubator at Caruth's<br>Study lamp machine<br>Draw plan of it<br>Study samples of abnormal eggs<br>Study eggs, soft and hard boiled |
| Poultry practice | **Clean and Spray Henhouse for Pullets**<br>**Pullets in Laying House for Winter**<br>**Condition Market Roasters**<br>**Market Old Hens** **Store Root Crops**<br>**Harvest Litter and Field Corn** | | | **Visit Poultry Show**<br>**Make up Breeding Pens**<br>**Feeding for Egg Production** | | **Hatch** (See March)<br>**Sell** (See March) |

| Mon. | March | April | May | June | July | August |
|---|---|---|---|---|---|---|
| Div. CLASS-WORK IN THEORY OF POULTRY CRAFT | **Brooding**<br>19. Natural incubation and brooding<br>21. Artificial brooding | 15. Summer management of laying stock<br>22. Care of growing stock | 23. Broilers, Roasters (review), Capons<br>24. Fattening, killing, dressing<br>25. Marketing | 26. Records, accounts, advertising<br>28. Diseases, parasites, enemies | | |
| LABORATORY PRACTICE | Make feeding board and hopper for chicks<br>Study types of stove and lamp brooders<br>Build coop for hen and chicks<br>Compute cost (Tompkins' place)<br>Study chick feed<br>See stove brooder at Tompkins'<br>Draw plan of brooder-house and compute cost<br>Study baby chick shipping boxes | Visit Tompkins' for management of growing stock<br>Plans for a colony house, and cost<br>Preparing water-glass<br>Make outdoor dry-mash hopper | Killing and dressing of broilers and hens<br>Study egg cartons and cases | Write advertisements, and make record blanks<br>Caponizing<br>Make lice powder and paste | | |
| POULTRY PRACTICE | **Chicks for Own Use**<br>**Day-old Chicks and Hatching Eggs** **Caponize ~ Clean and Spray Laying House** **Growing Chicks on Range** **Henhouses Repaired or Remodeled** **Market Broilers and Cull Pullets** **Growing Green Crops (Roots) for Winter** **Growing Corn — For Feed and Litter**<br>**Watch for Vermin — Clean and Spray Houses Weekly (Young Stock)** | | | | | |

FIG. 297. — An example of a seasonal plan of a live-stock project. The numbers at the left of items in the program refer to chapters in "Productive Poultry Husbandry" by Lewis. Note the freedom with which Mr. Doolittle, whose plan this is, disregards the order of the textbook chapters. See page 416. Concord Agricultural Department.

plated benefits which he is able to give both parents and pupils. The instructor should suit the size of the project, primarily, to the capacity of the pupil; and then require good work.

**A. Projects should not be too small.** — Pupils vary in strength and other capabilities, not merely from year to year as they grow up, but in any given year as one is compared with another. The size of the projects should be scaled to bring out the utmost endeavor and development of the individual pupil.

Speed up the boy's work by making his project big enough to require attack and dispatch for its competent execution. Make it so big as to avoid all tendency toward habits of dawdling and pottering. Let it be big enough to arouse his enthusiasm by making the profit he may reasonably expect to get appeal to him as being a real prize. Make the project big enough so that a competing job shall not get the boy away from school. In short, let each boy's project be such that it shall serve, not an avocational, but a vocational end of commanding importance.

Improvement and trial projects must of necessity be conducted on a relatively small scale, — the first, generally, from lack of capital, the second because of the factors of uncertainty. Improvement projects, however small, should appear somewhere in the pupil's work every year. Productive projects should be as large as possible for the reasons stated in the following paragraphs.

**a. The big project is a better test of a given method** than the small one because it covers more ground. A walk through a hayfield shows the stand to be uneven; so, also, fields of other crops. A better idea as to average production per acre can be had on the larger area than on the smaller.

**b. The big project yields the larger return,** — a return such as a man could afford to work for. That is to say, a little project tends to be a side line of effort, while the big project tends to be the main effort. The small project tends to be the small source of revenue; the big project, the principal source of revenue of the pupil. The small project may mean division of interest and effort, as between agricultural and some form of non-agricultural employment; the big project is likely to mean concentration of effort, time, and attention upon a distinctively agricultural undertaking.

c. **The big project bulks larger on the home farm** than does the small one. It means that the coöperation of the father, or the employer, has been cordially enlisted. It means a better test, under good conditions of tillage, of the home farm, or other farm on which the project is conducted.

d. **The big project bulks larger in the community** than does the little one. Every project ought to be an illustration of better methods than those usually followed in a farming community. A big project embodying better methods ought to be a more potent factor for the betterment of farming than a little one.

e. **The bigger the project the better.** — Experience with supervised home-farm work since its beginnings in 1908–1909 in Massachusetts, where projects have been conducted on a gradually increasing scale, has conclusively shown that the bigger the productive project the better, provided always, of course, the pupil does not undertake more than he can carry out in a thoroughly workmanlike and business-like way, and provided he carries it out with due regard to the three main farming factors, — production, marketing, and accounting.

(2) **Project work should be done in project clothes.** — Require that all project work shall be done in working clothes. Provide lockers for the ordinary school clothes and shoes and require a change of dress when project work is to be done on the school premises. Provide, also, conveniences for cleaning up after the work is done.

This should be looked upon as a perfectly reasonable rule, the non-enforcement of which would be absurd and must make the project work appear ridiculous.

Assignment of half-day blocks of time to each project group, in making up the school program, will be of marked assistance in enforcement of this requirement. This should be impressed upon those in charge of making the school program.

Parents, also, should understand this requirement and agree to it.

(3) **Untoward conditions should be accepted as a challenge.** — Residence at home should vastly multiply the benefits of vocational agricultural instruction. Bed-rock realities must be dealt with. Provision for the orderly, but immediate, trying out of ideas and methods, feasible for the locality, but new to the particular farm, should be made.

## THIRD YEAR CLASS — FRUIT GROWING

Frequent prepared debates; also, reading and discussion of timely articles in current agricultural journals throughout the year.

| SEPTEMBER | OCTOBER | NOVEMBER | DECEMBER | JANUARY | FEBRUARY | MARCH | APRIL | MAY | JUNE | |
|---|---|---|---|---|---|---|---|---|---|---|
| The outlook for orcharding in U. S.<br>Study of picking, grading, packing, marketing, and storage of fruit<br>Systematic pomology. Notes given, including small fruits, recitation and discussion supplemented by reference reading | | | Systems of coöperation and transportation studied<br>Costs, yields, and profits of some Mass. orchards studied from farm management records<br>Methods of advertising studied | Study of pruning and renovation of old orchards | Grafting, spraying apparatus, and materials<br>The spraying campaign discussed | Orchard sites and soils<br>Selection of varieties and nursery stock | The orchard — planting, cropping systems, cultural systems, implements and fertilizers used | Orchard insects and diseases | Study of small fruit culture | THEORY |
| Practice in budding peaches<br>Picking, grading, and packing of apples for farmers in this town (Concord)<br>Study of varieties and practice in judging and scoring apples<br>Instruction in selection and preparation of fruit for exhibits | | Two weeks' course at school in grading and packing apples, using the standard barrel, Western standard box, Boston bushel box, and variety of smaller special packages. (No work in theory at this time, all 3 periods each day occupied) | Computation of orchard costs, research among wide range of references on above | Overhauling spraying apparatus for farmers of vicinity<br>Visit to N. E. fruit show in Boston | Mixing of common sprays and making grafting wax in laboratory, using practical methods<br>Pruning for farmers in vicinity | Grafting in laboratory and for local farmers<br>Spraying in local orchards | | Frequent field trips to study orchard sites, soils, cropping systems, implements, etc.<br>Injurious insects and diseases of all fruits | | LABORATORY OR PRACTICAL WORK |

FIG. 298. — Seasonal Plan of Course in Fruit Growing. Submitted at the same time as that in Fig. 296 by the same instructor. These two plans cover only the months during which classes at the school are in session. Supervision of projects continues through the summer.

If funds are short, banks or citizens, before reluctant to extend credit, may be induced by the instructor to back any project which promises reasonable returns and which is to be conducted upon terms as to instruction and supervision agreed upon in advance. Notable instances of such extensions of credit which have turned out favorably to all concerned have come under the observation of the author. Habits of postponement are thus avoided. Conditions as they are found, beginnings as they must be made, first steps ahead which are possible, each farm considered by itself, should be accepted by both pupil and instructor as a challenge to action, well-studied, but instant and unafraid.

(4) **Ample school credit for project work should be provided for in the preliminary agreements.** — A sharp distinction should, of course, be drawn between work of the ordinary farm routine in which no application of the principles and methods taught by the vocational instructor is made, and the project work of the pupil in which those principles and methods are applied. Generous school credit for the latter should be included in the provisions of the preliminary agreements. No school credit should be allowed for the former.

### 4. Require Preliminary Agreements Covering All Approved Substitutes for Projects

Substitutes for projects may now and then be best for the training of a pupil who has no land at home, or whose home conditions are so limited or untoward that no adequate arrangements to apply the principles and methods of improved agriculture can there be made. Preliminary agreements providing for the educational phases of the farm work of the pupils should be made at the outset, and to them the employers, pupils, and instructors should jointly become parties.

Adequate arrangements can easily be made, if approved employment is restricted to work on farms where the farming is of a high order of efficiency and exemplifies the principles and methods taught by the vocational agricultural instructors. In such cases, the training in practical farming operations almost automatically takes care of itself. It remains only to agree upon the studies to be made by the pupil and the particular responsibilities to be assumed by him.

AGRICULTURAL STUDENT'S DAILY REPORT

BRIMFIELD VOC. AGR. SCHOOL
Name of School or Department
BRIMFIELD, MASS.
Location

IN CO-OPERATION WITH

H. C. Norcross
Name of Agricultural Student
BRIMFIELD, MASS.
Home address

YEAR 1914
Month and Day, *Aug. 17*
Day of Week, *Monday*

REPORT O. K
P., P., or Supt.
Initials
*I. G. D.* Instructor
Initials

| KIND OF WORK See directions inside Front Cover. Include implements used, number of loads, etc. | Field | Man Hours | HORSE No. | HORSE HOURS. |
|---|---|---|---|---|
| 4.30— | | | | |
| 5.00— | | | | |
| 5.30— | | | | |
| 6.00— | | | | |
| 6.30—Feeding cows and milking. H. proj. | | 1 | | |
| 7.00— | | | | |
| 7.30—Breakfast | | | | |
| 8.00— | | | | |
| 8.30—Mr. Davis came | | | | |
| 9.00— | | | | |
| 9.30— | | | | |
| 10.00——Cutting wood | | 2 | | |
| 10.30— | | | | |
| 11.00— | | | | |
| Hauling stone | | ½ | | |
| 11.30— | | | | |
| Hauling wood | | ½ | | |
| 12.00— | | | | |
| 12.30—Dinner | | | | |
| 1.00— | | | | |
| 1.30— | | | | |
| Looking for milk | | 1½ | | |
| 2.00— | | | | |
| 2.30— | | | | |
| 3.00—Getting in oats and peas. H. proj. | | 1 | | |
| 3.30— | | | | |
| 4.00— | | | | |
| Nothing done — rained | | | | |
| 4.30— | | | | |
| 5.00— | | | | |
| 5.30—Supper | | | | |
| 6.00— | | | | |
| Feeding cows and milking. H. proj. | | ½ | | |
| 6.30— | | | | |
| Getting ready for milk route | | | | |
| 7.00— | | | | |
| 7.30— | | | | |
| Peddling milk. H: proj. | | 2 | 1 | 2 |
| 8.00— | | | | |
| 9.00— | | | | |
| 10.00——Bookkeeping | | | | |
| TOTAL HOURS | | 9 | | 2 |

| Income. | Dr. | | Outgo. | Cr. | |
|---|---|---|---|---|---|
| *MILK* | 4 | 07 | *MILK* | | 36 |

| | NOTES ON | Morning. | Hour. | Noon. | Night. | Hour. |
|---|---|---|---|---|---|---|
| HOME FARM. | WEATHER | | | | | |
| | TEMPERATURE | | | | | |

Remarks:
Reverse carbon and continue remarks on back of white sheet at will.

FIG. 299. — Copy of a sheet, 8" × 11", from an approved form of pupil's day book in use in state-aided vocational agricultural schools and departments, during the time the U. S. Department of Agriculture, Office of Farm Management, was trying to induce farmers to use sheets like the upper portion of this one. This boy was up early. So was Agricultural Instructor Davis. Notice this boy included a little bookkeeping among his devotions. Not a bad plan for any good farmer. Copy filed with the instructor.

Studies such as a pupil employed by a progressive market gardener or dairyman may undertake are shown above in Fig. 146, and below in Figs. 222 and 223.

### 5. Make Project Study Outlines

(1) **Ask questions.** — Support, guide, and check the project work of your pupils by appropriate and directly pertinent project study. In organizing your teaching materials, whether found in books, in laboratory experiments or other tests, or in things seen and done outside the classroom, adopt the question method. Avoid, to the fullest extent, however, leading questions, questions which suggest an answer "yes" or "no." Ask questions which require study, thinking, and perfectly explicit written or oral replies. Ask questions to which most of the boys ought to find answers. Include now and then a question for your most capable pupil. Begin with questions vital to the success of the projects in hand, and appropriate to the season. Examples of seasonal planning of instruction which you may find suggestive are given in Figures 296, 297, and 298.

(2) **Cover the needs of every boy.** — By making the outline of questions full enough to cover the project needs of every boy in the class, certain questions may be marked, and others omitted, for individual pupils. A single outline may thus serve the entire class.

Be sure that each boy's project-study record is correct on all points necessary to the success of his particular project. Your questions will thus insure clear thinking, accurate statement, and properly planned work.

(3) **Include short units of related study.** — Do not prepare for your project study by study of books on "Soils," "Breeds," "Feeds," "Fertilizers," and the like. Apart from your textbooks used, from year to year, in your "Agricultural Survey" instruction, go straight at the study of the projects themselves and their requirements. Then from time to time loop in short units of study from your books, field trips, and the like on soils, fertilizers, feeds, breeds, and the rest. In Massachusetts such short units have been assembled, in some cases a hundred or more, in loose-leaf form. More recently very good models of such short units have been published, one in book form and the

**BRIMFIELD VOCATIONAL SCHOOL**

AGRICULTURAL DEPARTMENT

NAME, *H. C. Norcross* — MONTHLY SUMMARY SHEET

| DATE | EXPLANATION | PROJECT ACCOUNT | | | | | | | | PUPIL'S OTHER INCOME | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | HOURS | | *Dairy* | | | | *Potatoes* | | Farm Work at Home | | Farm Work away from Home | | Non-Farm Work | |
| | | Man | Horse | Receipts | | Expenses | | Receipts | Expenses | | | | | | |
| Oct. 1 | Care of cows | 100 | | | | 22 | 50 | | | | | | | | |
| " 1 | Grain | | | | | 8 | 38 | | | | | | | | |
| " 1 | Peddling milk | 42 | 42 | | | 14 | 70 | | | | | | | | |
| " 1 | Milk, @ .022 per lb | | | 50 | 25 | | | | | | | | | | |
| " 1 | Increase for milk peddled | | | 11 | 53 | | | | | | | | | | |
| " 1 | " " " sold at house | | | 1 | 00 | | | | | | | | | | |
| " 1 | Rent for pasture | | | | | 4 | 50 | | | | | | | | |
| " 1 | " " stables, @ 10% | | | | | 5 | 00 | | | | | | | | |
| " 1 | Int. on investment of $260 | | | | | 1 | 08 | | | | | | | | |
| " 1 | Manure @ $31.20 per yr. per cow | | | 7 | 80 | | | | | | | | | | |
| " 1 | Corn fodder | | | | | 2 | 65 | | | | | | | | |
| " 1 | | 82½ | | | | | | | | 20 | 63 | | | | |
| " 1 | Plaving [violin] | | | | | | | | | | | | | 4 | 50 |
| | Totals | 224½ | 42 | 70 | 58 | 58 | 81 | | | 20 | 63 | | | 4 | 50 |

FIG. 300. — Copy of a pupil's approved "monthly summary." Sheet can be used equally well for Daily Record. More than one project may be summarized on a single sheet, by allotting space as above suggested under the heading "*Potatoes*."

other in loose-leaf form. These have been listed above in the bibliography given in Chapter V, with the entry numbers 789.8 and 789.9.

(4) **Make outline overlap outline.** — Things frequently and distinctly recalled are best remembered. Study overlapping of reference materials, in your outline making, as aids to thorough reviewing and to facility in statement. Answers composed with much labor and difficulty at first may thus finally be made easily and promptly. Do not overlap your outlines too often, nor too much.

(5) **Make outline overlap textbook.** — Make your outlines not only overlap one another, but also overlap the approved textbooks used for the "Agricultural Survey" instruction. The pupil's knowledge will thus become well knit. You can hardly make your outlines and your textbooks excessively overlap.

(6) **Refer to illustrated matter.** — Remember that in most cases your boys are likely to be active and practical in their interests and abilities, rather than "bookish." Therefore, in your outline making refer wherever possible to pages which illustrate the points of the text by diagrams and photographs. You may thus make assurance doubly sure that the pupil will get the fact or principle which you send him to get.

(7) **Prepare outlines ahead.** — Devote one-fourth of the day or week in summer to the preparation of outlines for use during the fall term. The period free from teaching and supervision in winter may be extended to two months in Massachusetts for the express purpose of professional improvement. Until outlines covering the needs of a given school or department have been prepared, the instructor has been counseled to use a large part of his professional improvement time in making or improving outlines for use during the spring term. Thus the labor of outline making during the actual teaching terms may be reduced, and time gained for field, laboratory, and shop preparations.

The standard form of outline used in Massachusetts has been shown above in Chapter IV, and the project study bibliography, with uniform entry members for the state, to facilitate outline making, has been shown above in Chapter V.

Cow's Number *5*
Owner *G. W. Norcross,*
Address *Brimfield, Mass.*

Cow's Name *Juno* Weight ____ lbs.
Dropped Last Calf *March, 1913*
DAIRY IMPROVEMENT ASSOCIATION

| | YIELD FOR MONTH | | | YIELD TO DATE | | | | GRAIN AND ROUGHAGE ONE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATE | Lb. Milk | Test | Lb. Fat | Lb. Milk | Lb. Fat | Price of 1 lb. Milk | Total Value | Gluten Feed | Mixed Hay | Dried Corn Fodder | Wheat Bran | Gluten Meal | Dried Beet Pulp | Cottonseed Meal | Pasturage |
| 1913–14 | | | | | | | | | | | | | | | |
| October | 506 | 4.2 | 21.25 | 506 | 21 | .022 | 11.13 | 80.6 | 620 | 300 | 86.8 | | | | $1.50 |
| Nov. | 518 | 5.0 | 25.90 | 1024 | 47 | .022 | 22.53 | | 537 | | 62 | 174 | 16 | 84.2 | |
| Dec. | 410 | 4.8 | 19.69 | 14.34 | 67 | .022 | 31.55 | | 744 | | 62 | 159 | 8 | 93 | |
| Jan. | 399 | 4.8 | 19.15 | 1833 | 86 | .022 | 40.33 | | 775 | 403 | 48 | 44 | | 49 | |
| Feb. | 262 | 4.8 | 12.58 | 2095 | 98 | .022 | 46.09 | | 1008 | | 33.6 | | | 28 | |
| Mar. | 51 | 5.0 | 2.55 | 2146 | 101 | .022 | 47.21 | | 837 | | 37.2 | | | 15.75 | |
| Apr. | 338 | 2.8 | 9.45 | 2484 | 111 | .022 | 57.63 | | 540 | | 12 | | | 15 | |
| May | 790 | 4.65 | 36.74 | 3274 | 147 | .022 | 75.01 | | | | 37.2 | | | 11.2 | 1.50 |
| June | 858 | 3.9 | 32.76 | 4132 | 180 | .022 | 93.88 | | | | 26.4 | | | 12.8 | 2.00 |
| July | 769 | 3.6 | 27.68 | 4901 | 208 | .022 | 110.80 | | | | 16.8 | 60 | | 21 | 1.50 |
| Aug. | 653 | 2.8 | 18.28 | 5554 | 226 | .022 | 125.17 | | | | | 108.6 | | | 1.00 |
| Sept. | 569 | 4.2 | 23.90 | 6123 | 250 | .022 | 137.70 | | | 295 | | 105 | | | .75 |
| Totals | 6123 | | 250 | | | | | 80.6 | 5061 | 998 | 422 | 650.6 | 24 | 329.95 | $8.25 |

Acknowledgment — U. S. Department of Agriculture — Maine Department of Agriculture.

FIG. 301. — Copy of a pupil's approved individual cow

(8) **Coöperate in outline making.** — Considerable variation in the excellence of outlines is to be expected. The enthusiast for poultry keeping may be expected to produce the best study outlines for project work in this field; the enthusiast for dairying, the best outlines for dairying; the enthusiast for fruit growing or vegetable growing, the best outlines for study in these fields; and so on through the several fields scheduled for agricultural project training.

The Board of Education in Massachusetts, from time to time, has printed or multigraphed outlines prepared by individual instructors.

Breed *Holstein (Grade)* Registry Number _____ Born _____

Dam's Name and Number _____ Breed _____ Age _____

Sire's Name _____ Breed _____ Register Number _____

| Month | | | Cost | | | | | Balance | | | Lb. Digestible Nutrients in Daily Rations | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Oat Straw* | *Linseed Oil Meal* | *Corn Fodder* | Grain | Roughage | Total | One Quart Milk or One Lb. Fat | Total Cost to Date | Profit | Loss | Returns for $1.00 | Protein | Carbohydrates and Fat | Nutritive Ratio | Remarks |
| | | | 2.80 | 5.75 | 8.55 | .038 | 8.55 | 2.58 | | 1.30 | 2.23 | 14.51 | 1–6.51 | |
| 294 | | | 6.14 | 4.33 | 10.47 | .045 | 19.02 | .93 | | 1.09 | 3.97 | 17.93 | 1–4.52 | |
| 88 | | | 5.90 | 4.79 | 10.69 | .059 | 29.71 | | 1.67 | .844 | 4.13 | 17.36 | 1–4.2c | |
| | 29.6 | | 3.12 | 5.36 | 8.48 | .048 | 38.19 | .3c | | 1.04 | 3.23 | 16.49 | 1–5.11 | |
| | 33.6 | | 1.73 | 6.05 | 7.78 | .067 | 45.97 | | 2.02 | .74 | 3.00 | 15.73 | 1–5.25 | |
| | 18.9 | | 1.29 | 5.02 | 6.31 | .278 | 52.28 | | 5.19 | .177 | 2.11 | 11.81 | 1–5.59 | |
| | 16 | | .82 | 3.24 | 4.06 | .027 | 56.34 | 3.35 | | 1.21 | 1.45 | 7.77 | 1–5.35 | $4.00 added for 1 calf |
| | 122.5 | | 3.21 | 1.50 | 4.71 | .013 | 61.05 | 12.67 | | 3.69 | | | | |
| | 90 | | 2.44 | 2.00 | 4.44 | .011 | 65.49 | 14.45 | | 4.25 | | | | |
| | 21 | | 2.30 | 1.50 | 3.80 | .011 | 69.29 | 11.12 | | 4.45 | | Out | to | |
| | | 17c | 2.17 | 1.30 | 3.47 | .012 | 72.76 | 10.90 | | 3.14 | | Past | ure. | |
| | | | 2.10 | 1.27 | 3.37 | .013 | 76.13 | 9.15 | | 3.71 | | | | |
| 382 | 331.6 | 17c | 34.02 | 42.11 | 76.13 | | | 66.45 | 8.88 | | | | | |

Form furnished by Massachusetts Agricultural College Extension Service.

account. He had such an account for every cow in the herd.

or combined outlines prepared by more than one instructor in a given field and printed or multigraphed them. Due credit for outlines found of sufficient merit for this purpose has been given their authors. The best outlines, produced anywhere in the service have thus been made available for the improvement of the service everywhere. Where such a plan is followed, the hearty coöperation in outline making of all participants in this new type of teaching will be for the individual benefit of every man engaged in it. Without any misgivings as to the willingness of any instructor to do his part, such coöperative

effort, therefore, has been most strongly urged and the results have been highly appreciated. The results have come from carefully concerted division of labor.

(9) **Mark outlines for each pupil.** — Give each pupil a copy of the outline and have him put his name on the cover. Mark conspicuously, as with a red pencil, those questions and references mastery of which you believe to be essential to the success of the pupil's project. Direct him to omit all else, or to regard all else as "optional study." Do not consider an outline made, until it has been adapted exactly to the needs of each pupil.

(10) **Disregard the printed sequence** of questions and references. Start each pupil's study at the point at which an outline bears directly upon his productive operations. If he is studying poultry raising and must first build a house, start his study at poultry house planning and construction. If he must first cull his flock and fatten the surplus birds, start his study accordingly. Move him from point to point in the outline as the seasons and his poultry operations change. Do not consider an outline made, until it has been adapted to the seasonal sequence of the project work of each pupil.

(11) **Improve your outlines.** — Keep "desk copies" of your outlines; and improve each to the utmost, from time to time, by interlining new questions and references, and by striking out old questions and references not suited to the needs of your present or prospective pupils.

(12) **Carefully select reference materials.** — Examine books, bulletins, circulars, and reports before placing them permanently among your reference materials. Select only those which will be of immediate benefit to your pupils, taking into account their powers of assimilation and the requirements of their projects.

(13) **Keep the school reference file intact.** — Respect the property rights of your school or department. Do not regard as your personal property reference materials sent you, whether books, bulletins, circulars, or reports; but leave them in the project study file of the school or department, properly numbered or indexed for ready and permanent use. If you desire them, you can generally secure duplicates for your personal file.

### 6. Make Outlined Study Lead to Unoutlined

Of course, a major aim must be so to instruct a boy by formal guidance that he shall, little by little, come to find himself at home among agricultural books, bulletins, and current literature. To be able to find references and information for oneself on any given question is an important result of good education.

In connection with the study of certain questions, therefore, ask every boy, now and then, to find material by consulting the index or table of contents of some book purposely omitted from the project study outline. In like manner require every boy to consult the agricultural papers with particular reference to his project, as these are received from week to week.

Moreover, require each boy to develop a card index covering information of peculiar value and interest to himself; and a system of filing, and finding again, such notes, clippings, and free bulletins as each boy may be helped to accumulate for his private use and possession.[1]

Finally, send every boy home every day with a good agricultural book, bulletin, or report bearing on his home project; also, with a definite problem to work out, or a fact or principle to find, which, if it does not require it, shall at least attract to the boy's aid the coöperation of his father or some other member of the household. By this means the boy's interest in his project may be greatly enhanced. Incidentally, by this means, also, all members of the family may become participants in the educational work of the department or school. In sending books home be sure to include those which strikingly illustrate, with diagrams and photographs, the matters to be studied and reported upon.

All this will be effective training of the power of the pupils for independent study, and for study at home.

[1] For the purpose of introducing an indexing and filing system suited to farming, the Library Bureau, Boston, has agreed to put together and deliver at cost to agricultural pupils and instructors an outfit which has been used successfully for several years by practical farmers, and is now known by the name "Agricultural Project Study Index and File."

### 7. Require Talking

Discussion has been described as the philosopher's laboratory. Every good farmer must be something of a philosopher. The vocational instructor should be on his guard not to do more than his share of the talking. Most instructors talk too much themselves, and permit, or require, their pupils to talk too little. Require talking, both about things read or heard or observed, and about things planned or

| Date | Transactions | Hours | | *Dairy* | | | |
|---|---|---|---|---|---|---|---|
| | *1914 Financial Statement* | Man | Horse | Receipts | | Expenses | |
| | My labor . . . . . @ .25 | | | | | $161 | 50 |
| | Other man labor . . . @ .20 | | | | | 90 | 59 |
| | Miscellaneous expenses . . . | | | | | 65 | 64 |
| | Net profit . . . . . | | | | | 144 | 80 |
| | Manure, 55 tons . . @ $1.50 | | | $82 | 50 | | |
| | 5 Calves . . . . . @ 4.00 | | | 20 | 00 | | |
| | 31,342 lb. milk . . . @ .022 | | | 689 | 52 | | |
| | Stock bought . . . . . | | | | | 25 | 00 |
| | Inventory, 1913 . . . . . | | | | | 243 | 00 |
| | " 1914 . . . . . | | | 336 | 75 | | |
| | Feed . . . . . | | | | | 398 | 24 |
| | Totals . . . . . | | | 1,128 | 77 | 1,128 | 77 |

FIG. 302. — Copy of a pupil's approved "financial statement" for a year on a dairy project at home.

done. Take full advantage of the "round-up" period at the end of each agricultural half-day for this purpose. Especially during the summer, in your supervision of the projects or substitutes therefor, keep the scientific facts and principles dealt with in the classroom constantly reviewed in the pupil's talk with you about his work and his observations.

### 8. Keep Project Records

Complete project records should be kept by every vocational agricultural instructor. If you continue several years at the same post, you will need them for comparison, for constructive building of project on project to complete the education of each pupil, for evidence of your methods of instruction and supervision, and for evaluation of the

results of your work with your boys by those above you who must stand as sponsors for its continued support. If you leave your post for work elsewhere, your successor will need them. They will enable him to judge fairly your aims and efforts, and show him the foundations you have prepared for his further building.

(1) **Require careful planning and note-taking.** — Require evidence of project study in notebooks kept by the pupils. The most satisfactory form of notebook in Massachusetts reserves two-thirds of the left page, set off by a vertical line, for the details of the project plan and cross-references to drawings, as of a garden, a poultry house, or a barn; one-third (next the center) for the references consulted; and the entire right page for notes which indicate how well the pupil understands what he has planned to do or is doing. This form of notebook enables the instructor to review at a glance the authorities consulted, whether in print or in person. It also has the merit of keeping constantly before the eyes of the pupil the kinds of project knowledge with which he is dealing and their mutual relations. That is to say, you will greatly assist him toward ability to sort ideas, toward clarity of thinking, and toward cogency of reasoning, if you will require the pupil to keep *action* — the program of action he proposes to follow — on the left page; and keep *reflection* — the notes of the pupil indicating the study he has made and his intellectual grasp of his project — on the right page. On the left, keep what the pupil proposes to do; on the right, keep record of the factors which have controlled the pupil's judgment in deciding to do what he proposes.

The particular form of notebook, however, is but a means. The desired end is clear evidence of sound thinking. The pupil, in some form of notebook, should be required to reduce his approved agricultural ideas to writing, because this will be one of the best forms of evidence that his training is placing such ideas at his command.

The state supervisor will doubtless desire to inspect these project study records of the agricultural pupils; but, quite apart from their value as evidence for state or federal aid, these records should be kept with such care as to be of permanent value to the pupils themselves in their future unsupervised farming projects.

Almost immediately the project study outline and note-taking

method as an aid to teaching individuals, as distinguished from teaching classes, gave evidence of its value to the pupils themselves. One example may suffice to show some of the results of this method.

When Mr. L. B. Boston, then vocational agricultural instructor in Petersham, returned from the summer conference in 1913, he wrote the author: "Yesterday on my visit to Nelson I found him more than ever on the job. He can think of nothing else but ducks. He seems to have been doing a good bit of outside reading on the subject, for he gave me for correction ten full pages of duck notes that he had composed for himself. He took the initiative and made out his own outline — writing the answers to his own questions. Such work as that is encouraging to a teacher."

Notice that this boy was working on a farm where he had found ducks, and that the studying and note-taking were done in summer when this boy was hard at work during the day. Other boys have made outlines for themselves of such value that they have been incorporated in the outlines prepared by instructors and printed or multigraphed, for general use in the state.

There can be no doubt that most boys may be schooled in methods of work which they will naturally continue. All pains taken in guiding their first steps will be abundantly rewarded by the life-habits established.

(2) **Require accurate accounting.** — Each project pupil in Massachusetts keeps a daily time and account sheet. A satisfactory form of such a sheet which can be used for both the daily items and the monthly report is shown above in Fig. 300. From the daily record, accounts for different projects are made up, and summaries of the various projects and other earnings of the pupil are made. An example of an approved monthly summary is shown in Fig. 300. Accounts of a dairy project may include such a detailed individual cow account as that shown in Fig. 301. Elaborate as may be individual cow accounts, such as that above referred to, the financial summary for a year on a dairy project where such accounts for all cows are kept may be reduced to very simple form. This can be seen in the summary shown in Fig. 302. All of the foregoing examples are from one boy's accounting on projects conducted the same year.

During the time when the office of Farm Management of the U. S. Department of Agriculture strongly urged farmers to use the daily record book it had prepared, a book like it, in the interest of good teamwork, was used by agricultural pupils in Massachusetts. Alternate sheets were perforated at the edge. Carbon paper was used, and the sheets giving the carbon copies of the daily records were detached and filed with the agricultural instructor. Space was added for notes on unseasonable or otherwise significant conditions of weather and temperature, also for items of outgo and income to be spread on the project accounts. A copy of that form of sheet from among those filled out by the boy above referred to, is shown in Fig. 299. When the Washington people ceased urging farmers to use such sheets, their use by agricultural pupils was discontinued, in favor of a simple day book; or a special time, temperature, and project account sheet; or sheets like that shown in Fig. 300, above mentioned.

Pupils have shown greatest interest and efficiency in accounting where instructors have helped them to work out classifications of items of income and outgo in separate columns under headings of particular interest to the pupils; and provisions for comparison by years of inventories and the like. Though excellent results have been had elsewhere, no instructor has been more successful in this than Mr. A. W. Doolittle of Concord. With him, a poultry pupil's account book begins with pages reserved for the "Inventories" from year to year. Next, pages are reserved for "monthly statements" of "Resources," and "Profit and Loss," including the "Balance," whether profit or loss. Then, pages are reserved for the "Yearly Summaries" in which the totals by months are shown under the following headings:

| | INCOME | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | ITEM | MARKET EGGS | | HATCHING EGGS AND CHICKS | | MARKET POULTRY BROILERS | | TOTAL | | |
| Nov | Total for month | $3 | 35 | | | | | $3 | 35 | |

EXPENSE

| MONTH | ITEM | FEED | MISCELLANEOUS | LABOR | TOTAL |
|---|---|---|---|---|---|
| Nov. | Total for month | $6 40 | | $2 17 | $8 57 |

Finally, there follow most of the pages of the book ruled according to the foregoing classifications of "Income" and "Expense," with detailed items entered from day to day, under these headings, on opposite pages. These accounts are balanced and ruled off with red and black ink in good bookkeeping form monthly.

Mr. Wells A. Hall, Superintendent of Schools in Concord, has coöperated with Mr. Doolittle in another incentive to alertness and accuracy. He has approved an arrangement by which selected pupils in the commercial department of the Concord High School audit monthly the project accounts of the agricultural pupils. He has approved, also, an arrangement through which, by use of the School Bank, Mr. Doolittle is familiarizing his agricultural pupils with bank papers and procedures. All items of "Income" or "Expense" are put through the school bank, by deposit, check, note, and the like, just as such items are taken care of by aid of banks in the cases of adult farmers.

Director George H. Gilbert of the Bristol County Agricultural School has introduced the use of an even larger and more durably bound book, and, aided by the father of two of his pupils who is a banker, has put a premium on personal accounts and thrift by awarding prizes for the best-kept accounts and the best evidences of personal thrift.

Methods and devices like the foregoing cannot be too warmly commended.

If, for purposes of state or federal aid, it becomes necessary to file certain financial returns on your projects or those of your pupils, keep the minds of your pupils and your own mind clear as to the separate

and wholly different purposes to be served by such returns. Put yourself and your pupils in the way of picking up the data for state or federal returns from day to day. The daily time and account sheet shown in Fig. 300, on page 412, above referred to, is in form to enable the instructor to pick up all data on the employment of agricultural pupils required in Massachusetts. But bear in mind that such a sheet as this should meet two quite distinct and independent needs, the need, on one hand, of a report to the state, but the need, on the other hand, of the pupil himself as a farmer.

If you are in charge of school projects, see to it that you keep exactly the same kind of accounts that you require of your pupils. Doing this should tend not only toward accuracy but also toward clarity and simplicity. Require accounts such as you think the pupil will find valuable in after years as a farmer, and will be able to keep with so little labor that he will never neglect or be without them.

(3) **Make photographic records.** — Use a camera. Records by photographs are convenient. They may be readily filed and compared. For printed reports or public exhibitions they are interesting evidence of work done; and as evidence of equipment, methods, and results, they are, when taken by the supervising instructor, both illuminating and convincing. The eye of the camera is faithful. Credit is given where credit is due. The eye of the camera is, also, inexorable, — it neither condones nor forgives.

Home surroundings, for example, may in one respect or another be bad, yet the instructor's photograph may be the first vivid means of showing the boy his home as others see it — his home as it is. On the photograph, or by its aid, the boy may select modest projects for improvement which are to be carried out within the first year; others, within the succeeding years of his school course. Later photographs will show that he has done what he planned to do towards making his home what, at his hands, — considering the boy's age, strength, and resources, — his home ought to be.

In many neighborhoods the best types of live-stock, for another example, can only be shown the pupil by aid of illustrations in farm papers or in books. It will add not a little of interest and value to the instruction of the pupil, if, in addition to comparing, for example,

the boy's best cow with the highest record queen of her breed and type, as shown in a book or paper, a photograph of his cow taken from the same point of view as that of the illustration be placed side by side for comparison with that of the queen. The boy may thus be made to see the more vividly what to work towards in his future buying or breeding. Photographs of farm products of unusual excellence may endure long after the products themselves have been sold or consumed, and may afford the only means of comparing the form and appearance of products one year with those of earlier or later years. For educational purposes such photographs add vastly to the value of records dealing with types, yields, and comparative results in farm production.

The architect uses a camera for record of the ground on which, and of the surroundings among which, his proposed building is to be placed. The landscape architect uses a camera in order that he may the more effectively work from existing grades, contours, and planting to the final grouping of trees and shrubs, contours, and grades which his design will establish. Even in athletics the crew and football coaches find the camera a fault-finder and a praise-bestower more convincing on one hand, and more inspiring on the other, than their strongest words. The traveler records now in photographs more often than in journals the things he has seen and done. Camera records are widely valued.

If the camera may be an inexorable revealer of agricultural faults, it is evident that it may, also, be made a faithful revealer of agricultural virtues. In short, a camera, used in connection with each boy's instruction from the beginning to the end of each boy's course, must be looked upon by the sympathetic instructor as one of his most important aids, not merely in faithfully recording the home progress of his pupils, but also for inspiring and sustaining the highest order of project work and project study.

(4) **Make farm practice records.** — Keep a record of each pupil, showing your opinion as to his capacity for planning farm work and his skill in farm operations. Keep the kind of record which would enable you to recommend a boy for a particular job, if he were to leave school before graduation; or for a more responsible job, if he were to complete the full course.

Make a list of the things the most capable boy may be trained to do in matters of farm routine. Then test each boy from time to time, and check to his credit those items on your list for which he shows you that he should receive credit. Include such items as ability to harness a gentle horse, to harness a horse that is notional if not exactly vicious, to harness a pair of horses, and for various purposes; to plow; to cultivate; to mow by hand and by machine; to milk, to cleanse and sterilize utensils, to keep down the numbers of bacteria in milk by care of stable, cows, and his own person and clothing; to prune and to spray; to size, to pack, to store, or to sell fruit and vegetables. Include items as to his habits, such as whether or not he rises early without calling, or promptly when called, is regular, punctual, and reliable in doing chores, is a willing worker, and the like.

Make your certification records progressive. Let them center around the groups of projects published for given years, and advance year by year from group to group. By the end of each boy's course you will thus know from your own observation what each pupil is capable of doing.

Finally, as your knowledge of each boy grows, reduce your record to writing. Put it in a form which may become part of the permanent records of your agricultural school or department.

Following is a section from what the author considers the best form of farm practice record so far developed in Massachusetts.

| **Swine Keeping** (All required for those taking Swine Keeping) | **Skill at Entrance** | **CERTIFICATION** | | | |
|---|---|---|---|---|---|
| | | **Skill** | **Age** | **Year** | **Certified by** |
| 1. Caring for and feeding brood sow and pigs | | | | | |
| 2. Caring for and feeding growing pigs | | | | | |
| 3. Caring for and feeding fattening hogs | | | | | |
| 4. Butchering | | | | | |
| 5. Castrating | | | | | |
| 6. | | | | | |
| 7. | | | | | |

The sheet from which the above section is taken covers the detailed farm practice required in connection with the projects of a four years' course, and measures 18″ x 24″. Such a sheet shows at a glance any gaps which ought to be filled, in order to balance up and complete the training undertaken in each boy's case. For this purpose it is better than smaller separate sheets or cards. Another section from this sheet is shown above in Fig. 180. Under "Skill at Entrance" each boy is asked to give himself the rating he thinks he deserves at the outset. Ratings by the instructor are entered as earned. Such a permanent, intelligent, and clear-cut record is due both instructor and pupil.

(5) **Make supervision and instruction records.** — A convenient form of supervision record is shown in Fig. 303. This was filled out by an instructor at a visit to one of his pupils. It is 4″ x 6″, or exactly the right size to file behind the sort of enrollment and agreement tab-card shown above in Fig. 290.

The record of a visit should single out only the most important items of instruction or comment. It should, of course, be legibly written.

A natural method of using such a blank is first to go over informally all matters of importance, then to say, "If you will wait a moment, I will jot down a few of the things mentioned," and, finally, to say, "If you will sign this, I will leave it with you." Few will demur at signing the slip. The carbon copy left in your book will then serve as a voucher in case of controversy, and, in any event, as a memorandum of what was done at this visit.

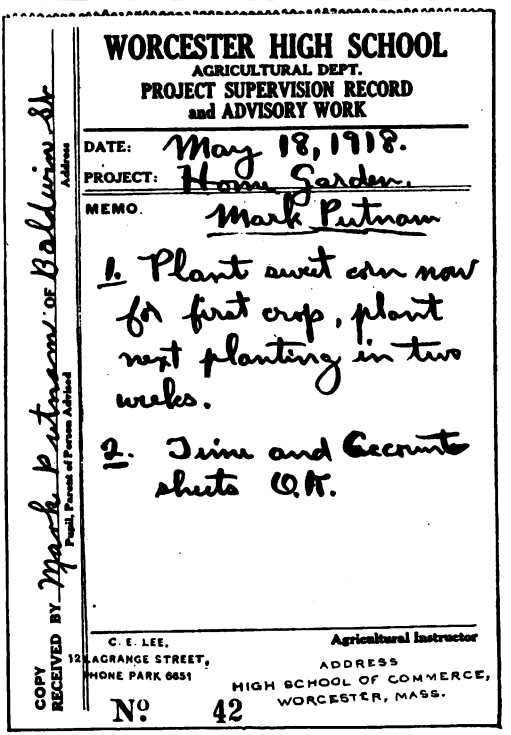
People are prone to forget. Records of this sort are of the utmost value in all advisory work and itinerant teaching. Advice and instruction can be put in very simple terms. Rations, fertilizer names, formulas for spraying, varieties, quantities, and the like may be so stated as to avoid any possibility of error. By using a rubber stamp, if the printed slip does not give this information, you can show at the bottom of the slip the school you represent, your name and title, your telephone number and your post-office address. Thus the person visited or advised may find in his hand all desirable information.

If a pupil is delinquent, let him sign and receive your warning once; but be sure to let the parent or guardian receive and sign for the second. Thus, all laxity and misunderstandings may be avoided.

If you go to a new position, your successor will find such records invaluable. They will show him exactly what you have advised or taught and the responses of those with whom you have worked.

(6) **Require reports in writing.** In addition to his planning and related study notes, each pupil should jot down through the year his occasional observations as to conditions, favorable and unfavorable to his projects, and any incidental data of scientific or practical importance.

**A. Reports for the project instructor.** — When the accounts previously discussed are filed, there should also be presented a written report based upon such careful records as those just mentioned, showing the essential scientific and economic factors ob-



WORCESTER HIGH SCHOOL
AGRICULTURAL DEPT.
PROJECT SUPERVISION RECORD
and ADVISORY WORK

DATE: May 18, 1918.
PROJECT: Home Garden.
MEMO. Mark Putnam

1. Plant sweet corn now for first crop, plant next planting in two weeks.

2. Time and Accounts sheets O.K.

COPY RECEIVED BY Mark Putnam OF Baldwin St
Pupil, Parent of Person Advised — Address

C. E. LEE, Agricultural Instructor
12 LAGRANGE STREET, PHONE PARK 6651
ADDRESS HIGH SCHOOL OF COMMERCE, WORCESTER, MASS.
No. 42

FIG. 303. — Agricultural instructor's supervision and instruction memorandum and the oilcloth cover into which the pad of blanks fits. Sheets 4″ x 6″, stock size to fit enrollment tab-cards when filed. See page 426.

served during the progress of each project. The report should, of course, be written with special reference to the things which the pupil, as a result of his experience, would do, or avoid doing, in future projects of like character.

Let the written report, so far as it deals with project management and results, be of exactly the same sort that you yourself file on the completion of a season's project work on school land, if you have conducted projects at a school; and let it be filed at the same time as your own report. Thus, you and your pupil will be turning over in your minds at the same time the same sort of project, and a comparison of observations and conclusions should be doubly interesting and valuable.

Occasional reports to bring out the pupil's sense of the educational factors in his course are valuable. Following are excerpts from a report of a pupil in which he shows that he clearly understands why his instructor has not taught all projects alike. They are from the report prepared by H. C. Norcross of Brimfield, from whose accounts the examples are given to which reference was made in the foregoing section on accounts.

After describing his farm experience before and after entering the vocational agricultural course, and reporting upon his five home projects conducted that year, this pupil continued:

These three latter projects [soiling crops, corn and potatoes] were taken up in a different manner from the other two [dairying and orchard renovation]. Instead of studying and practicing at the same time, I began my study last fall, and before I had begun to put my knowledge into use a great deal I had practically concluded my study.

My experience with this school has taught me that there are two kinds of projects. In the first place, there are those whose practical side the pupil is engaged in every day in the year upon his own farm. There are also those which the pupil can put into practice but once a year. The first case can be illustrated with the project, dairying. Nearly every pupil who studies dairying has a herd of his own. He has not been caring for it in a way to insure him the maximum production at the minimum cost. When he learns that by balancing the ration he can double the milk flow, he naturally is anxious to try it. He may make a few mistakes at the beginning, but by experimenting he finally succeeds in producing the desired effect. Naturally encouraged with the results, he takes added interest in his work; and, by putting the acquired

| VOCATIONAL AGRICULTURAL SCHOOLS OR DEPARTMENTS | 1917 | | | | | | |
|---|---|---|---|---|---|---|---|
| | ENROLLMENT | | | EARNINGS | | | |
| | Boys | Girls | Total | Farm Work | Other Work | Grand Totals: Cash | Grand Totals: Total Cash and Credit |
| **Schools** | | | | | | | |
| Northampton | 43 | — | 43 | $ 9,495.73 | $ 217.88 | $ 2,628.43 | $ 9,713.61 |
| Bristol County | 50 | — | 50 | 10,645.79 | 1,422.70 | 8,558.61 | 12,068.49 |
| Essex County | 161 | 2 | 163 | 36,760.35 | 3,224.03 | 23,087.34 | 39,984.38 |
| Norfolk County | 42 | 1 | 43 | 4,136.53 | 384.19 | 3,550.78 | 4,520.72 |
| Weymouth Branch | 10 | — | 10 | 2,820.20 | 101.30 | 2,869.70 | 2,921.50 |
| **Departments** | | | | | | | |
| Petersham | 6 | 1 | 7 | 2,187.53 | 94.05 | 391.68 | 2,281.58 |
| Hadley | 21 | — | 21 | 5,694.40 | 171.50 | 1,048.86 | 5,865.90 |
| Harwich | 8 | 3 | 11 | 2,395.30 | 554.08 | 1,562.28 | 2,949.38 |
| Easton | 15 | — | 15 | 3,733.46 | 406.75 | 2,962.46 | 4,140.21 |
| Brimfield | 10 | — | 10 | 4,726.73 | 17.50 | 555.30 | 4,744.23 |
| Ashfield | 16 | — | 16 | 3,362.56 | 332.94 | 3,117.00 | 3,695.50 |
| Concord | 29 | — | 29 | 9,346.34 | 308.00 | 5,004.15 | 9,654.34 |
| Marlborough | 10 | — | 10 | 2,079.88 | 345.07 | 998.78 | 2,424.95 |
| Clinton | 10 | — | 10 | 3,544.09 | 309.77 | 493.57 | 3,853.86 |
| Reading | 32 | — | 32 | 4,350.64 | 430.00 | 2,273.80 | 4,780.64 |
| Leominster | 14 | — | 14 | [1] | [1] | [1] | [1] |
| New Salem | 6 | — | 6 | 275.53 | — | — | 275.53 |
| Newton | 13 | — | 13 | 2,697.44 | — | 2,697.44 | 2,697.44 |
| Orange | 15 | — | 15 | 3,248.37 | 488.40 | 1,951.08 | 3,736.77 |
| Totals | 511 | 7 | 518[2] | 111,500 87 | 8,808 16 | 63,751.26 | 120,309.03[2] |
| Totals for 1912 | 66 | 4 | 70 | 9,754.28 | 1,345.89 | — | 11,100.17 |
| Totals for 1913 | 86 | 3 | 89 | 15,399.90 | 2,582.61 | — | 17,982.15 |
| Totals for 1914 | 230 | 5 | 235 | 37,936.67 | 4,124.06 | — | 42,060.73 |
| Totals for 1915 | 413 | 5 | 418 | 51,279.89 | 4,974.86 | 25,229.73 | 56,254.75 |
| Totals for 1916 | 489 | 8 | 497 | 75,766.53 | 8,406.90 | 44,977.15 | 84,173.43 |

FIG. 304. — Earnings of vocational agricultural pupils from farm work and other work during the periods covered by their school attendance and their farming projects.

[1] Returns not complete. Agricultural instructor drafted.

[2] In addition to this, 2549 persons over 17 years of age who did war garden work under the supervision of vocational agricultural instructors, grew agricultural products for home use and for sale or exchange to the value of: Sold or exchanged, $28,097.21; for home use, $45,083.50; total, $73,180.71. This work was done in Falmouth, Holyoke, North Adams, North Attleboro, Norwood, Saugus, Wakefield, and Worcester.

knowledge into immediate practice, he obtains the benefit at once, instead of in a year or two when he has finished the course.

Now let us consider the other kind of projects. These we will illustrate with potatoes. This project is one the profits of which are to be realized only after three to five months of hard work and many expenses. These profits will be influenced by every move on the part of the pupil, according as it be correct or incorrect. Therefore before starting he must be absolutely certain that he is right or the crop will be limited by his mistakes. Consequently the pupil has no time to experiment as with the dairy; for, while in this case he may decrease the production of one cow for a day or two by his errors, in the second case he will be likely to lose $150 or $200. To be assured that he is correct he must make a thorough study of the subject, — not taking one man's word as infallible, but reading the experiences of different successful potato growers and comparing them. He must do everything possible to exterminate the limiting factor which is bound to arise with every mistake. We can readily see, then, that although it is a very good plan to put knowledge into immediate practice, one cannot always afford to do so unless he be sure of the outcome. Therefore in my opinion these two methods of study should be retained in the school as two distinct systems, each to be equally important and either one to be applied as the case may demand.

Now, of course, we have taken great interest in all of our projects, both at home and at school, but I think this interest has been caused to a great extent by the records and accounts which we keep. Each student in the dairy class is furnished with a record book in which he inserts every month the production of each cow separately. This he is able to do by the use of the milk scales and daily milk record sheets. He also weighs the grain and roughage fed the cows each day, and tabulates the total for the month in the record book. The milk of each cow is tested once a month, and in this way it is a very easy matter to find the profit or loss of every cow for the year. We are also given blank sheets on which we keep account of all receipts and expenses on our crops. We are enabled to make the entries for labor at any time by the use of the daily time sheets which we make out every night. Therefore we can tell at any time the exact amount put on each crop or cow. In this way our projects are completed, and we have the satisfaction of knowing that they have been done right.

Our interest in our work never wavers for an instant, for we know we are bound to succeed in the end.

**B. Reports for possible publication.** — Miss Maud Amsden was the champion potato grower in 1916 among agricultural club members in this state. Her notes and accounts were important aids to winning. That they were exact and valuable will be evident from the following newspaper account in which the award was announced.

Maud Amsden, an 18-year-old miss from Petersham in Worcester county, is the state champion in the Massachusetts boys' and girls' potato club for 1916. On one-eighth of an acre she raised 44.9 bushels, a rate per acre of 359.2 bushels; and this was on land which had been farmed for 100 years. The variety was the Irish Cobbler, the seed was treated with formalin for scab, cut into two-eye pieces, these pieces planted four inches deep in rows two and a half feet apart and the pieces 12 inches apart in the rows. The vines were sprayed four times and were not damaged by insects or disease. Her product was exhibited at Springfield, January 9–12, and was there judged for quality. Her "story of experience," which is required from all club members, ranked very high indeed. There was a total of 500 in the club, distributed throughout the state, and while there were one or two others whose yields were slightly larger they failed to complete all the requirements of the club.

This is the young lady Dr. Lyman Abbott visited in 1917 and speaks of in the following chapter on page 458. She was in the vocational agricultural course. That club work and vocational agricultural education may be combined to good advantage where the age limits permit will be evident from her following notes on her 1916 experience: "I am sure that my crops would have been less of a success if I had not treated my seed with formalin for scab. . . . He [the agricultural instructor] had advised me several times to do this. . . . I thought it would be all right to use sulphur in its place. . . . At the last minute Mr. Edwards called and advised me by all means to use formalin. . . . I used it and cannot thank Mr. Edwards enough. . . . He advised spraying. It was the last time for doing this and I had decided to leave this spraying out, and thought the field would

be all right; but he said, 'Spray by all means,' . . . and accordingly I gave my field another spraying." Her notes show that her instructor "measured off the eighth acre of land," that "when the crop was harvested, he weighed the potatoes," and that he gave her "more good advice concerning not only the potato project, but poultry, swine, cattle, and sweet pea projects" which she was carrying that summer. Her record includes the remarks, that the potato crop was "greatly improved over preceding years," and that the course in agriculture had helped her "wonderfully" toward keeping her accounts, for as she said, "Before, I seemed not to do very well, and now it is all clear to me." After graduation, she wrote to ask if she might continue to be supplied with account sheets and to turn them in monthly.

C. **Reports for double credit.** — Written reports may be made to serve a double purpose, that of the project teacher and that of the teacher of English or economics. Following is a short paper prepared for a teacher of English in the Essex County Agricultural School. It is a bit introspective, sufficiently so to indicate a well-defined motive for attending a vocational agricultural school, though the only girl in the class; but it is primarily a story of agricultural aspiration, adjustment, and achievement:

THE ORIGIN AND DEVELOPMENT OF MY INTEREST IN AGRICULTURE

The lonesomeness of a newcomer in a small town was probably responsible for my becoming interested in agricultural activities. Some four years ago we moved a couple of miles from one part of Merrimac to another. In the new neighborhood I found I was practically a stranger. The girls of my age were divided into small groups, unwilling to admit strangers or new ideas. Each group of girls kept apart in games and social activities, and if I was to find companionship I found it necessary to form a new grouping. Fortunately I was interested in bird-study, and we soon started a bird club, which rapidly grew to thirty members, from all parts of town and from all classes. It was laughingly said that our Bird Club was the only democratic organization in town. When our Bird Club won third prize in a National Audubon competition open to all Bird Clubs the townspeople were secretly much pleased.

I could see how our Bird Club gave the girls broader interests and made them friendly to each other, and I was anxious to help along a similar movement. The state club movement seemed to offer the best chance.

Among other ideas for community improvement my mother was leader of the Home Garden Club in Merrimac. My younger brother and sisters and myself of course were in the contests. We exhibited freely wherever possible in order to show what children could do. I won over $50 in cash prizes, exhibiting three years at Amesbury Fair and one year at Topsfield. I also sent exhibits to the state fair and to the Eastern States Exposition, and have competed in stock-judging contests at Amesbury, Topsfield, and Springfield.

My exhibits included products from my garden, canning done in the Canning Club, pigs raised in the Pig Club, and stories of my club work. I had considerable success in winning prizes along these lines, and have also won prizes in story-writing.

The greatest pleasure and benefit to me lies in the chance I have had to watch the gradual unfolding of these ideas in the community. For instance, the Merrimac Garden Club members held small local exhibits of their products, and these exhibits attracted such attention and interest, that the Grange in our town was spurred to run an agricultural fair. This fair was the first they had had in forty years. At my mother's earnest request a table was provided for the children of the Garden Club, and this table was one of the best exhibits in the hall. The Grange found a financial benefit in taking an interest in the general public, and after several of their agricultural fairs, which they have made an annual feature, they have collected a sizable fund towards building a hall of their own.

On account of the comparatively cheap land available close to good markets there would seem to be unusual opportunities for one properly trained for Agriculture in New England. Because I liked out-door life and enjoyed civic development of the community, I decided to get an agricultural training. I applied for admission to the Essex County Agricultural School, and because Director Smith was familiar with some of the things I had done, I was admitted as a pupil in the agricultural course, where I am the only girl in the class. To avoid excessive travel in going to school, and to secure better practical experience along agricultural lines taught in the Agricultural School, we have taken a farm in North Andover. This location is near enough to school so that the transportation question is solved, while the farm offers so many problems in different soils and possible crops, orchards, cranberry meadow, woodlot, and sanitation that I should have a wide knowledge of correct farm methods by the time these problems are solved.

The school course promises training along the agricultural lines necessary to make farming profitable. I find that girls can do the work thought generally to belong more properly to boys. In contest with Bristol County I got the school letter for winning first in seed identification.

Stock-judging is another course offered to more advanced classes. In judging four classes of stock at Amesbury Fair, I won first prize, so was admitted a member of the school team to receive special instruction in judging

at the National Dairy Show in Springfield. Some objection was raised to my competing against the ninety-seven boys representing the ten North Eastern States in the dairy-judging contest. The Essex County and Massachusetts state officials made such a vigorous protest that I was finally allowed to compete. I won second prize, and chose a bull calf, "Sophie 19th's Tormentor 10th," a grandson of "Sophie 19th" of Hood Farm, the world's champion long-distance butter cow. The first six of his brothers sold for an average price of $502, while one brother brought $4000.

The writer of the foregoing account is shown above in Fig. 193.

**D. Reports for the "educational manager."** — Your state or federal supervisor of vocational agricultural education may at any moment decide to test your knowledge of the spirit and mental attitude of your pupils, of their home conditions, and of details of their battle for agricultural betterment.

The general rules in state-aided vocational education in Massachusetts require that in all schools of over fifty pupils there shall be established a "function" of some member of the faculty, the purpose of which shall be to promote efficient instruction, to follow the educational and trade progress of each pupil, and to prescribe special work for individual pupils as their needs may require. In 1917 there were 167 boys in the Essex County Agricultural School, and Mr. Dexter E. Coggeshall was designated the "Educational Manager" with the foregoing "function."

The author, as state supervisor, to test Mr. Coggeshall's intimate knowledge of individual pupils, asked him for brief reports on the four boys mentioned in the three reports which follow. It will be evident that immediate response would have been impossible in the absence of detailed and reasonably complete records. It should be stated that Mr. Coggeshall is the teacher of English and economics for whom the foregoing account by Miss Ruth Wood was prepared.

THE STORY OF THE PARTNERSHIP OF JOHANSON AND BLOOM

Mr. Johanson, the father of one of the boys in this story, wanted to get his son off the streets of Lynn during the long summer vacation. Accordingly, he proposed to his boy and to his boy's playmate that they have a garden together. He hired land for them, — about 8000 square feet. The boys were in the 7th grade of the grammar school at this time. They did not

relish the idea of giving up their play to 'cuff' in a garden. However, they managed to grow a fair crop of corn and beans. Mr. Johanson felt that the boys had had a more profitable summer than they would have had on the streets of Lynn.

The next summer, when they had finished the 8th grade, they added 1500 square feet to their garden, and grew corn and beans as before. By this time they had become interested in their project.

It was at the end of this summer's work that they first heard of an agricultural school in their own county. They investigated, and found that it was open to them; so they talked it over with their parents and decided that they would try to get into this school at the end of their grammar school course.

When they graduated from the grammar school they had fully determined to go to the County Agricultural School, and to carry on a larger garden, — one that would occupy most of their time. This year's garden had peas, potatoes, cucumbers, as well as corn and beans. They had more than enough for home use, so they sold to neighbors.

In the fall they entered the County Agricultural School. They studied Vegetable Gardening, Farm Accounting, English, and General Science. To their surprise, they learned that they really did not know much about gardening, even with their three summers of experience. Their interest in the study of vegetable gardening was most keen; in fact, they had never before studied anything with such enthusiasm. In the winter months they planned their summer's project. This garden was to be much different from the former gardens; for they had learned something of companion cropping and succession cropping. Also, they had learned the value of a dust mulch.

The investment in this garden was $150, and their gross income was $457. This is how they did it: First, they planted spinach and early peas. They harvested 50 bushels of spinach and 20 bushels of peas. In the meantime, they had started lettuce in hotbeds. Next, where they had harvested the spinach, they put in beets and turnips, with lettuce between the rows. Where they had planted the peas they now planted celery, with lettuce between the rows. They also planted potatoes on the newer part of their garden. These boys both smile when they compare this project with their former gardening efforts. Needless to say, they have both decided to take up farming as a vocation.

Wise Mr. Johanson believes that his idea of substituting gardening in the summer for playing on city streets with large groups of boys was a good one.

These are the two boys whose partnership project and earnings report for 1917 are shown in Figures 142 to 145.

### The Story of DeQuoy's Projects

DeQuoy was fifteen years of age when this story begins. He had studied two years at the Haverhill High School with poor results. He was not interested. In the fall of 1913 he heard of the County Agricultural School. He had never been interested in Agriculture, but he decided to enter and to find out, as he says, "If there was anything in it." His mother owned and operated, in a small way, a farm of about seven acres of land. This boy has now carried three successful projects. We will now see what those projects were like.

I asked DeQuoy to write me of his first year's project, and this is what he wrote: "As I had land at home, I planned to have my garden there. I planted tomatoes in the house the middle of February, and cabbage for plants in the hotbed in March. I built the hotbed from old lumber and storm sash. From the cabbage plants alone, I made about ten dollars. I also set a few in my garden. I had my garden plowed in the middle of April. It was only ninety feet long and fifty wide, but to me it seemed a big farm. I spaded it over after plowing and put in the early peas. Then other vegetables were planted in season and all sorts of companion and succession schemes were used to keep every bit of land working every minute. On the whole garden, I made about fifteen dollars over and above labor and other expenses."

He exhibited some of the products of his garden at the County Fair and won a first and three seconds.

It was during this first project season that he did the thing that was to win his interest in Agriculture, and to settle his life's work. He bought two sittings of Single Comb White Leghorn eggs.

His second year's farm work was varied in its nature. He had three distinct projects. First, he set out 500 strawberry plants and 100 raspberry plants. Second, he bought a pair of Ohio Improved Chester pigs. At six months of age these pigs dressed 165 lb. apiece. The pigs were entered in the pig club, and he won a premium because of their daily gain in weight. They made an average gain of one pound a day. Third, he raised 200 White Leghorn Pullets from the nine pullets of the previous year. The nine pullets won him the third prize in the Poultry Club. They averaged six and one-half eggs a day during the contest.

DeQuoy now decided that his real interest was in the poultry business, so he carefully selected the best of his 200 pullets as breeders for his next season's project.

The third year's project was a pronounced success. The first hatch came off March first, and from then until July his two incubators were constantly running. Eighteen hundred eggs were set, twelve hundred chicks were hatched. He sold six hundred baby chicks, and raised to maturity five hundred and ninety-five of the remaining six hundred.

Again, this year, he entered twelve of his Leghorn Pullets. These birds made a daily average of 9½ eggs for the entire length of the contest. These twelve pullets earned DeQuoy $33.00 net profit during the contest. They won for him the first prize in the Poultry Club, and helped him to win one of the Bauer prizes in the County Agricultural School. In fact, every one who saw this boy's project marveled at his success; for, to speak truly, his work was done with little capital, and under adverse conditions. His income from his poultry projects for this, his third Agricultural School year was $218.61 paid himself for labor and $333.16 net profit, or a total of $551.77."

This boy in his fourth year has been employed on an approved substitute for a project, as a helper in the Poultry Department of the Essex County Agricultural School.

THE STORY OF EASTWOOD'S AGRICULTURAL INTEREST

Eastwood went one year to the high school. On the completion of this first year high school work, he told his parents that he wanted to be a farmer. His father was somewhat surprised but he decided to try his son out. He hired an acre of land and set the boy to work. The garden was a complete success; and Mr. Eastwood was convinced that his son should be given an opportunity to get an agricultural education. It was then decided to send the boy to the County Agricultural School.

At the county school he was obliged to carry an agricultural project each year. We will now see what each year's project was like. His first year's project was carried on at the school farm. He had a half acre vegetable garden and one Berkshire pig. When he was not working on his own project, he worked on the school farm at general farm work. His accounts of this, his first project, were particularly good.

This young man's second year of farm work was what we call a substitute for a project; that is, he worked on a general farm that belonged to a gentleman in Peabody, Massachusetts — Brooksby Farm. On this farm he cared for thirty pigs, ten cows, and about three acres of fruit. He cost-accounted the pigs and the cows. Again, his accounting was most praiseworthy. Also, he won first prize in stock judging at the County Fair.

Eastwood's third year of farm work was also a substitute for a project. This was the management of a twenty-acre farm belonging to a Haverhill business man. The work was done entirely by Eastwood, with the help of a small boy working part time. Eastwood worked from early morning until about seven o'clock in the evening. After seven o'clock he worked on his accounts. His work on this place won him what is known as the Bauer prize — $20.00 in gold. Following is a brief description of the project: It consisted of the care of three cows and one heifer; two pigs; one hundred and

fifty hens; the raising of three hundred chicks; ten acres of field crops; one-half acre of small fruit; one-half acre of large fruit; five acres of vegetables. The noticeable features of his work were the changing of the rations for the cows, pigs, and poultry, so that greater production was experienced; also, more frequent cultivation of the soil, which resulted in a yield of one hundred twenty-five bushels of potatoes on a half acre of land.

Let us now look at his accounts. These accounts show the net income for each department on the farm. The total shows the amount of money he earned for the owner from May the sixth to November first, namely, $898.32.

*Receipts*

| | |
|---|---|
| Poultry | $507.27 |
| Dairy | 417.89 |
| Garden | 282.79 |
| Field crops | 472.20 |
| Swine | 53.00 |
| Large fruit | 55.13 |
| Small fruit | 57.48 |
| Horse | 93.14 |
| Bees | 21.50 |
| Gross receipts | $1,960.40 |

*Expenses*

| | |
|---|---|
| Poultry | $ 297.88 |
| Dairy | 236.13 |
| Garden | 165.76 |
| Field crops | 162.79 |
| Swine | 48.89 |
| Large fruit | 11.63 |
| Small fruit | 31.44 |
| Horse | 83.84 |
| Bees | 23.72 |
| Total expenses | $1,062.08 |

| | |
|---|---|
| Gross receipts | $1,960.40 |
| Total expenses | 1,062.08 |
| Profit | $ 898.32 |

His fourth year finds him back on the farm at Haverhill. He now has four cows, three heifers, and a large beekeeping project. He says that he will practice more intensive cultivation this year, and that he will keep a better set of books.

He plans to go to the Agricultural College in the fall. His father says that he believes the boy really wants to be a farmer.

This boy's employer was well pleased with his second year of work. He is now enrolled for a year or two of further education in the technical and most practical courses at the Massachusetts Agricultural College.

**E. Reports for the state supervisor.** — It may more than once happen that the state supervisor will wish to go straight across to a boy for a test of his ability to make a report in writing. Following is a report to the author as state supervisor made by a vocational agricultural pupil who finished his four years course in 1916, but who continued his projects in 1917 in connection with taking supplementary high school studies in preparation for further training at an agricultural college.

### My Success with Vocational Agriculture

In the fall of 1912 my father bought me 15 hens. I kept them in the basement of the barn. The next spring I had saved money enough to buy 100 eggs for hatching. I had sixty chickens and raised them all; I had 33 good pullets out of the flock. They laid well, making an average per hen of 198 eggs for the year.

The next spring and summer I had a hundred pullets hatched, and built two houses. I continued to hatch more chicks each year and build more houses. I sold 2400 hatching eggs in 1915, 2600 in 1916, and 2451 in 1917. I have been well patronized by the State Sanatorium at R. I. for the last two seasons. In 1915 I received an order for 1500 hatching eggs from them. The order was filled. Last spring they asked me to bid on an order for 1170 eggs and 1100 chicks. I did so and received the order for 1170 eggs. Last fall when my hens were in their winter quarters I had 291 hens and pullets, and 15 Tom Barron cockerels.

Every summer for the past four years I have been doing considerable gardening. I have had two to three acres of land under cultivation.

The fall of 1915 I bought two acres of wood land, had it cleared and set apple and peach trees in the place of the pines. At present I have over two-hundred apple, peach, and pear trees, also 281 raspberry and 35 blackberry bushes.

For two years I kept a cow. I bought the cow for $40. During the two years I cleared $232.06 above cost of feed and sold her for beef for $40. I have also kept pigs for two years and though having to buy all the feed have found them profitable.

I have been in several of the state contests, winning a second in Poultry and a third in the Pig Club. The prizes of these were a trip over New England and a week at the Camp at Amherst.

To sum up my net earnings for the five years: My personal expenses have been paid from the earnings of my projects. A very promising season is before me with a big flock of hens laying heavily, and a fine opportunity for garden produce. I have at present, by careful inventory, in cash, real estate, houses and equipment and stock, $775. I have prospects of clearing $100 on peas this season. At present I am clearing $17 a week on my hens; and putting it at an average of $10 per week from now to September I shall have $170. I am also planning potato and bean crops. The total of this figures $1045.00. In September, 1917, just five years after I made my start at 14 years of age, I shall have a balance on the right side of the account of more than $1000. This has been done besides attending school two sessions a day for the entire five years.

I have been admitted to the Ontario Agricultural College. I shall enter next fall for a four year course.

Very truly yours,

Ralph W. Williams.

You see there is no lack of definiteness in the data from which such a report as this could be immediately made. With such data at hand a report almost writes itself.

You see, also, that Ralph's father had given his boy modest property rights. His father told the author that he had not given his boy fifteen dollars in the past five years. Ralph was not disappointed in his expectations for the summer of 1917, and entered the agricultural college of his choice in the fall as he had planned to do.

This boy's first big egg order and his photograph are shown above in Fig. 126.

### 9. Keep in Touch with Graduates

Check your instruction by the success of your graduates and of your pupils who, for one reason or another, were not able to complete their courses. You may thus be able to judge of the success of your efforts to restrict enrollment in your vocational classes to pupils who really desire to follow careers of farming.

Fig. 14 above shows a chart prepared in 1914 for the Panama Pacific Exposition by Mr. C. L. Pepper, Agent for Industrial Education in Massachusetts, setting forth results of a comparison of agricultural pupils with those admitted to other vocational schools with reference to continuance in the industry for which they had been

given more or less training in this state. It will be seen that the comparison is strikingly favorable to the agricultural schools and departments.

But more interesting than percentages will be the reports of their achievements which your graduates will be very willing to make you about once a year, if you will take the trouble to ask for them.

The sort of reports the author, as state supervisor, likes to find among the records of instructors may be illustrated by the following reports from Stanley Bartlett, who entered the first state-aided vocational agricultural class in Massachusetts at the Smith School in Northampton of which the author at that time was director, who lived at home throughout his course, and who conducted one of the first home projects at a school which sold its own herd of cows in order that no time should be lost thinking about school cows, and all possible time gained for work concentrated on the improvement of the home herds of its pupils.

Stanley did fair work in his various courses, but some of the courses did not interest him and found him more or less indifferent. He may be seen above in Fig. 106, the first of the boys from left to right in the center. It is evident that he was not so much interested in beekeeping as were other members of the class. His strong work began when he came to the study of dairying. He began to show his pride and real mettle when week after week one of his father's cows headed the list on the blackboard with the highest percentage of butter-fat among the cows represented in the class.

Stanley Bartlett's father gave him the right kind of support. When asked if he could get permission to feed one cow at home a balanced ration, he came back with his father's reply, "Better not feed one cow. Better feed them all." He kept the records of the entire herd, and knew the profit or loss in the case of each cow. And he did everything possible to produce a perfectly sanitary product.

His father and an older brother were able to carry on the home farm without his help. He faced the problem, therefore, on graduation, of finding satisfactory employment elsewhere. The reports from him which follow will speak for themselves as to his education for farming and his satisfaction and progress in his chosen career.

In February, 1915, he wrote from the Sanatorium of the Metropolitan Life Insurance Co., Wilton, N. Y.:

It was through Director Loomis of the Smith School that I secured a position at Hood Farm. I took up my work there on July 1, 1912. My first work for six weeks was taking care of 40 cows and milking 15. After this time, I was changed to fitting cattle for auction. On Sept. 7th, I left Hood Farm with a partner and 40 head of sale cattle for the Dairy Cattle Congress, Waterloo, Iowa, and the Hood Farm, Shoemaker, auction sale. When the auction and show were over, I came back to Milwaukee, Wisconsin, with a few

FIG. 305. — Eight Sophie's Tormentor cows. Owned by Hood Farm, Lowell, Mass. Average yearly records: 14,784 lb. 8 oz., of milk; 895 lb. 2 oz. of butter. Stanley Bartlett, a Smith School graduate, was proud to be working with such animals. See next page.

show cattle to the International Dairy Show. When this show was over, I came back to Lowell with the show cattle after being gone one month from the farm. This month gave me a whole lot of experience in the care, handling, and showing of cattle. From that time until January 1, 1913, I was taking care of the high record cows and milking. The great amount of practical experience I had gained thus far through Mr. Dodge just gave me the right start, so I then took the ten weeks' course at the Massachusetts Agricultural College in dairying and allied subjects.

When I finished my course at M. A. C., I accepted a position as herdsman and dairyman on the farm of H. A. Moses at Woronoake Heights. The herd

C. Stanley Bartlett.

His old home and cows that were in his home project.

FIG. 306. — His present place of employment in charge of more than 100 head of Ayrshire cattle and an equal number of pure-bred Berkshire swine. See, also, Fig. 305, and his reports on pages 442–446. Stanley Bartlett was one of the first boys to conduct a home project.

consisted of 50 head of Ayrshires. I had two men under my direction. This was a very sanitary, modern dairy barn with cement floors and walls and equipped with litter carriers. In April of 1914 I decided to take the position as assistant herdsman which Mr. Dodge had offered me at Hood Farm. I took up my work there on May 11, 1914. The herd consisted of 200 head of the very highest class of Jerseys in the world. I had 9 and 10 men under my direction at that time. Along in August, I started out with a partner and 20 head of show cattle. I went out to the Forest City Fair near Cleveland, Ohio; then came back to New York State Fair at Syracuse; and then to the Worcester Fair at Worcester, Mass. We got back to Lowell about the middle of Sept.

The highest price at which a Hood Farm cow has sold is $3500.00.

The highest price at which one has sold that I have fitted for sale is $1500.00.

The highest record made by a Hood Farm cow which I have cared for is a senior three year old record of 17,793 lbs. 8 ozs. of milk and 1071 lbs. 4 ozs. of butter.

The Hood Farm doesn't keep any imported Jerseys. They are all of their own breeding.

I had about 20 head of pure-bred Jerseys at home. My best record at home (on one cow) was a profit of $54.26 in 7 months.

It was through Mr. Dodge that I secured this position which I took on October 20, 1914. This is the most modern, most sanitary, and finest set of farm buildings in the country, I believe. I have full charge of barns, cattle, and dairy. The stock consists of 30 cows, one bull, and nine calves, all Ayrshires. I am making 450 quarts of milk from the 30 cows. All of this milk is used at the Sanatorium. As the Sanatorium grows, the dairy will have to grow, so I expect to have 100 head of cattle. I have four men at present.

Now my wages the first year at the Hood Farm were $30.00 per month, board and room. When I started work at Woronoake Heights, I got $35.00 per month with board, room and laundry, but was soon raised to $40. My last year at Hood Farm, I got $40.00 per month, board and room. My wages here are $900 per year and all my expenses.

In April, 1916, he wrote again from Wilton, N. Y.:

Since writing you, I have taken charge of the herd of Berkshire swine. I have 48 head beside the spring litters which number 32 thus far and I expect that number will double when they have all farrowed. We keep nothing but pure-bred Berkshires. I attended the meeting of the American Berkshire Congress which was held in New Brunswick, N. J., in February. Mr. Dodge of Hood Farm sold a boar at the Congress auction for $1100.

My herd of cattle has increased until I now have 65 head and am milking 42. These 42 cows are making about 625 qts. of milk per day now. An extension for 40 cows is nearly completed which I expect to fill with more cows

this summer and fall. Of all the yearly records, 25 in number, or all the cows which have worked here one year, I got an average of 9800 lbs. per cow for the year. My best yearly record was 13,000 lbs. of milk from one cow. Most of these have freshened this spring and have started out extremely good. I now have 6 men under my charge.

I expect to get married this coming June and I will live here on the Farm. My salary has not changed as yet, but I expect it will when the herd gets larger. I am to have my house rent, fuel, vegetables and milk and cream with my present salary of $900 per year. I am very well satisfied with my position here and expect to make it more or less a permanent position.

His latest report dated April 9, 1918, follows:

My present salary is $1020 per year with house rent, fuel, milk and cream, vegetables and fruit.

My family has increased of late. We have a fine little girl born March 30, 1918.

I am sorry to say that I haven't taken a photograph since we were married but hope to take some soon and will gladly send any worth while ones to you which you may use in any way you may want to.

The best record completed here thus far was finished on April 7, 1918. The record was made under advanced registry rules and by "Old Home Lilly" "28630," namely 16,011 lbs. milk and 586.42 lbs. butter-fat. All milk records or lactation periods finished during 1917, numbering 34, average 8,342.6 lbs. milk and 333.8 lbs. butterfat. We produced during the year 1917, 123,260 qts. whole milk, 4051½ qts. heavy cream and 35,514 qts. skim milk. Our herd of Ayrshires consists of 105 head at present. About 55 of these are pure breds and we have about 58 of the 105 head milking cows. Our average production is not near as high as I would like, but we need every bit of milk I can produce so that I have not culled the herd as I should have done.

Our Berkshires are doing first rate. We dressed 98 hogs during 1917 which weighed 25,746½ lbs. We have nearly doubled our brood sows for the coming year and hope to sell a lot of pure bred pigs. We are planning to put our Berkshire business on a better basis this year by moving to a large tract of light dry ground and putting up modern, sanitary buildings.

I now have 7 men under my charge.

We have a tractor. But of course thus far I have had nothing to do with the outside farm work. My work is exclusively with the live-stock here.

Such records are abundant evidence that vocational agricultural education is worth while, that it is doing what it ought to do. They steady the instructor in hours of uncertainty and hearten him in moments of discouragement. They show that pupils, though not

always equally interested and successful in everything covered by a course, are pretty certain to discover their special bents and develop unusual skill in certain directions. Best of all, perhaps, is the effect of such records of modest, but gradual and steadily growing achievement, upon pupils still in school. Pictures of Stanley Bartlett's home farm and herd, of Hood Farm cows with which he worked, and of a barn at his present place of employment may be seen in Figs. 305 and 306, on pages 442 and 443.

### 10. Help Educate Gentlemen of the Old School and Farmers of the New

As a sort of résumé of certain factors important for the success of vocational agricultural education, and as an aid to keeping educational sympathies and efforts in desirable balance and perspective, the author ventures to offer these concluding suggestions.

(1) **Help train farmers of the new school.** — Spare no pains in efforts to work with agricultural educators and with farmers in your efforts to give boys adequate training for farming careers. Suggestions in the foregoing chapter may be of some assistance to you, if you are at all at a loss as to ways and means of close coöperation.

Do not try to do the whole job yourself.

Persuade farmers to participate in your teaching program. Invite them to visit projects and to examine pupils.

By assisting the farm bureau, or the grange, or any other board or organization whose duty it is to promote agriculture, in arranging for field meetings and demonstrations on farms, help farmers to teach each other.

By arranging field trips and trips to their home farms, and by encouraging boys to take at least short courses at the agricultural college, help to bring other agricultural educators and your pupils together; and help your pupils to teach each other, by showing each other what they have learned, discovered, or been able to do.

Assist the College Extension Service and the Farm Bureau in planning and giving dull-season, short courses for farmers and for others who have land or live-stock which they desire to make contribute to

their support; and help those who take such short courses to get lasting benefit from them, by systematic, but not meddlesome, visitation throughout the producing season.

Remember the boy that needs a friend. Be particularly careful to help boys who may not be able to attend school full-time, but who, on your invitation, and with your cordial encouragement, may be able to attend your classes part-time and to conduct projects of considerable educational and economic importance under your patient and painstaking supervision. Let them drop in for study, or for advice, rainy days, or at any other time they may find convenient. Bear in mind that, in any case, the best teacher is the man who knows his subject, but lets his pupils do the work. The project plan will enable you to set any boy at work at any time.

Serve as local leader of agricultural club-work. Thus you may come to know most of the children in your locality, — and they may come to know you. Pay particular attention to boys twelve and thirteen years old. Though instruction in your classes must be suited to the needs of boys over fourteen years of age, there is nothing magical about the fourteenth birthday. There are boys of fifteen and sixteen who are but thirteen and twelve in all physical, mental and moral essentials to education; and *vice versa*. From your work with men, you will know how older boys look at things. Since, under normal conditions, your work will usually begin with the boy who is fourteen, it is of the utmost importance that you should know how boys of about that age look at things and can best be taught. Previous work with a boy in out-of-school hours in club activities will help to prepare you for efficient work with him afterwards in agricultural education in school hours. Moreover, leading agricultural club-work will help you to admit pupils to your classes with better judgment as to their natural aptitudes for farming careers.

All of the foregoing should help you to measure up to the requirements and opportunities of the vocational instructor, as an agricultural " trouble-man " for the adults in his community, as a " big brother " to boys out of school, and as an educator of boys in classes to become farmers, alert, capable, progressive. And in all of this, you may gain an enviable reputation as a man upon whom all, who are in any way

interested in better farming, can depend as a coöperator, a program maker, and, in the best sense of that term, a promoter.

(2) **Help educate "gentlemen of the old school."** — But do not let your influence stop here.

Do not become a narrow-minded crank. There is danger, for it is hard to determine just where the enthusiast stops and crank begins. We admire the former, and like to work with him; we abominate, or laugh at, the latter, and try to avoid him.

Do not permit "old home week" to be chiefly a matter of roast chicken or roast pork and plum pudding, of pumpkin pie and big apples, yellow or green or russet or red; and of agricultural exhibits. Help with all this. But remember the village improvement club. Rake and remove your share of the litter, and hang your share of the decorations.

When you are showing your classroom, do not fail to show the rest of the school and have a worthy word for its all around good work.

Encourage your boys not to neglect the opportunities for general education provided for in such complete programs for both schools and departments as those discussed in Chapter VI, and shown in Figs. 188 and 189. Impress upon them the values of education for better farming, but equally urge the values it may have for better living. Avail yourself in this of such aids as those shown in Figs. 6, 7, and 8.

Remember the community center recreational activities which are, or ought to be, contributing to the public welfare of the locality you serve. All work and no play makes the community a dull community. Be a pioneer, if necessary, in efforts to bring the whole community together, the past and the present together. Music, pageants, and games, — all manner of wholesome and whole-souled recreation, — should have your help and that of your pupils. Figures 281 to 287 show a few examples of kinds of recreation in which vocational agricultural instructors and pupils have participated with very great profit.

Remember the public library, the hospital, and the church.

Try to forget, and to permit your pupils to forget, no worthy cause. Be no more a rural economist than you are an economist. Be a sociol-

ogist, not merely a rural sociologist. Your first responsibility, as a specialist, is for education in arts that are practical. But have a place in your life for the arts that are liberal. As the years pass, be better and better able, in the happy phrase of a recent writer,[1] "to see life steadily and see it whole." In a word, be a helper of all that is best in human welfare and progress.

Strong and gentle spirits, the poet and the philosopher, the statesman and the man of affairs, have sung and otherwise happily expressed their appreciation of agriculture as a fundamental occupation and of farming as a delightful mode of living. Farmers have not so often nor so happily voiced their appreciation of other fundamental occupations and of the graces and refinements of other modes of living. What is needed to-day, as never before, are not less diversity of talents and training, but more unity of spirit, greater community of understanding, more joining of hands in common causes.

We have inherited an expression which we somehow cling to as precious, namely, "gentleman of the old school." A farmer to whom we might apply it would be no less successful than the most progressive of his fellows. The term rings of prosperity. But it savors nothing of the narrow, nor of the envious, nor of the uncouth. It savors of a spirit of broad, human understanding, of sympathy at once gentle and strong. Education is a life-long enterprise. Covet for your boys such balance and perspective and such a quality in their education, both during the periods of their formal schooling and in after years, that, proudly and affectionately, it may be said of them, "They are gentlemen of the old school."

[1] Mr. David A. Pottinger in *Harvard Alumni Bulletin* for Feb. 6, 1919, page 370.

FIG. 307. — Where the home-project baby was born in 1908–1909. This is the Smith Agricultural School at Northampton, of which the author was the organizer and first director. It flies both state and national flags. It was the first state-aided agricultural school in Massachusetts and among the first to receive federal aid.

# CHAPTER IX

## THE NEW EDUCATION[1]

### MAKING FARMERS

**Editorial Correspondence by Lyman Abbott**

LAST March I met at Hampton Institute a delegation of educational experts who had been selected by the Rockefeller Foundation to study the methods of what is probably the most efficient vocational school in the United States, if not in the world, and report on them. The immediate object of this investigation was to get at the truth; but its ultimate object, I do not doubt, was to get the advantage of this truth in promoting a better type of vocational training throughout the United States. Among this delegation I had the good fortune to fall in with Mr. Rufus W. Stimson, one of the educational inspectors of the State of Massachusetts especially intrusted with the supervision of the agricultural schools of that state. I very gladly accepted an invitation from him to take, under his guidance and direction, a four days' automobile trip through the state, visiting some of those agricultural schools.

There is in Massachusetts an agricultural college, situated at Amherst. Like other similar colleges, it is not exclusively agricultural. In addition to such practical courses as dairying, farm management, market gardening, poultry husbandry, and the like, it also furnishes scientific instruction in cognate branches, including not only botany, general and agricultural chemistry, and microbiology, but also such subjects as modern languages, rural sociology, and civil engineering. The practical tendency in education in our time is indicated by the fact that in the last ten years the enrollment of students of college grade has increased from 219 to 680.

[1] Reprinted with Dr. Abbott's permission from *The Outlook*, July 25, 1917, pp. 473–475.

There are also four agricultural secondary schools devoted wholly to agriculture and cognate arts, including the art of home-making, which, in spite of the scorn of some pseudo-reformers, I hold to be the most fundamental and the most important of all our arts. One of these agricultural schools is endowed; the others have been established under permissive laws of the state by the counties in which they are severally situated.

There are fourteen local high schools provided with agricultural departments equipped to furnish training to such boys and girls as desire to take a course to fit them for practical farming. Not many of the graduates of the college become farmers, though they meet the increasing demand for farm superintendents, who enable some gentlemen of wealth to play at farming, an expensive and losing game when conducted by those ignorant of the science of agriculture, and other gentlemen to combine their money with the intelligence of their superintendents in a quasi-partnership which gives the farm what all large farms need, both adequate capital and scientific supervision.

But the agricultural schools and departments of the high schools are organized and conducted especially for the purpose of preparing boys and girls to conduct farm industries of profit to themselves and to the community. In addition to the fourteen high schools with agricultural departments, there are eight others which hope to open an agricultural course in the fall. It is not unreasonable to anticipate that when the scores of boys who have enlisted for the summer in the present agricultural campaign return to their schools in the fall many of them will wish to continue the work. I passed in my trip one camp of these agricultural soldiers from cultured city homes. They were living in tents, and were earning from one dollar and a half to two dollars a day from the farmers in the neighborhood. The success of their work had silenced the skeptics, and I was told that another score of boys could find employment on the same terms in the same neighborhood if the boys could be obtained.

The most immediately striking feature of the educational work in the agricultural departments of these high schools is its practical character. The Board of Education requires that each applicant before admission shall be visited at his home by his prospective proj-

ect teacher, and that a written agreement shall be entered into by both the parent and the pupil by which the pupil agrees to do his best to carry out the teacher's course, including project work, and the parent approves the pupil's application and promises his support and co-operation, pledging himself that the pupil "shall have the time and land, equipment and supplies, required for properly carrying out his home project work." Subsequently the project work of the pupil is more specifically defined. He agrees, for example, with the approval of his parent or guardian, to cultivate a quarter of an acre of vegetable garden, or an acre of corn, or six rows of potatoes, or a dozen fruit trees, or to take care of a cow or a couple of pigs or a score of hens. I can best illustrate this by reprinting here his project card:

MASSACHUSETTS BOARD OF EDUCATION
VOCATIONAL AGRICULTURAL PUPIL'S EMPLOYMENT
STATE INSPECTION RECORD

Location of School or Dept. *Ashfield* School Year Ending *June '22* 191 *7*

Pupil's Name _____ Age *16*

Home Address *Cummington, Mass.* Or, Working Address _____
(if working out)

Home Projects (Breeds, Varieties, Extent, etc.) *11 Apple Trees*
*1 A. Mangels (Norbition long red). 3 Dairy Cows to June 1st*

School Projects do. _____

Other Farm Work *Crops—Teaming—Haying—Milking—Horses*

Non-Agricultural Work *None*

Project Work Instructor and Supervisor *H. L. Whittemore*
(name of)

I have filled up the blanks from an actual card in my possession, leaving out only the name of the pupil. The teacher visits the pupil at his home and rates him according to the skill and industry which his home project indicates. The condition and yielding of his hens or his corn or his cow or his fruit trees constitute his weekly or bi-weekly

examination, and the pupil never knows when his teacher is coming. The teacher is not allowed to take more pupils than he can visit, as a rule, weekly, at their homes, and at least as often as every two weeks. The maximum number of pupils allowed to any teacher is twenty.

It is not enough that the teacher possess a scientific knowledge of agriculture. That is perhaps the least important of his qualifications. He must have a practical knowledge of the farm and the farmer's life; must be able to see the farmer's problems as a farmer sees them; must have had extensive practical experience on a farm; and must have tact, force, and a vital interest, not only in raising crops, but in raising boys and girls. Perhaps the easiest way to put this problem before the reader is to portray a not wholly imaginary case.

The Massachusetts law requires that the children of the state shall be kept in school until they are fourteen years of age. At fourteen the child may be taken out of school and set to work as a money-getter. The father has been looking forward to the time when his boy, hitherto only an expense, shall become profitable to him. He has a poor opinion of " book learning " and an exaggerated opinion of his own ability to teach his boy better than the school can teach him. But the boy has no inclination to abandon his school life and his schoolmates and go to the drudgery and the lonely life of the farm. He tells his teacher of his desire to go on with his school work; but he cannot go on with his school work without his father's consent. Now is the teacher's opportunity and the teacher's problem. Opportunities are always problems and problems are generally opportunities. The teacher goes to see the father. For this interview he is equipped by his practical familiarity with farm life and farm problems. He may find a father eager for the better education of his child. Then the teacher's problem is simple. He may find the father indifferent or even hostile. Then the teacher's problem is difficult. He succeeds, however, in getting the farmer to talk the matter over with him. What farm work does the boy do? The work for the boy to do is outlined by the father. What would the father have to pay a boy from outside to do that work? The material for an answer is right at hand. Other farmers are paying two dollars a day for the work of boys who have had no experience on a farm, and therefore are pre-

sumptively worth less than his boy. How much do the food and clothing of his boy cost? At this period of the interview the mother is called in. The mother is generally more eager than the father for her son's education. Together they figure up the cost in dollars and cents of the boy's keep, estimating at market prices for all the farm food which he consumes.

The boy never before realized that he was paid anything for his work. To him it was unpaid drudgery. The father never before realized that he was making money out of his boy. Perhaps never before in their lives did the father, mother, and son sit down to discuss together the problem of their common life. The father sees a little light and is ready to listen to a practical proposition. It comes from the teacher in some such form as this: Let your boy do as much of the farm work as will fairly pay the cost of his keep. Let him have some hens or a cow or a piece of ground as his own and make what he can out of this, his home project. Let him come to the school in such time as he has left and get what we can give to him. And I will come once a week or once a fortnight, will supervise his work and give him my counsel, not only on his home project, but on his farm work. This will cost you nothing. The boy's work will pay you for his keep; the education in school and at home will benefit him and increase his earning capacity; you can try the experiment for a year, and then bring it to an end if it does not succeed. Often the father accedes cordially to the proposal when thus put before him; if not, he finds it difficult to stand out against the influence of the teacher, the desires of the boy, and the persuasions of the mother. The boy is entered in the agricultural department of the high school. He lives at home; pays for his living by his work; has a minute farm assigned to him for himself; and has a teacher whose wise friendship is a guarantee against failure.

Not the least advantage of this arrangement is the new relationship established between father, mother, and son — a relationship of mutual regard. The son realizes what his parents are doing for him, because he pays them by his work the recognized market price. The father recognizes the value of his boy because the profit earned by his boy's work has been estimated in conference with him by an impartial

outsider. The husband and wife get at least a glimpse, which they had not before, of their economic value to each other and of their boy's economic value to them. They thought that he was a burden; they discover that he is an asset. And the boy gains a new self-respect as a valuable member of the household and finds an inspiration in his work which makes it no longer drudgery. The whole household becomes naturally a profit-sharing concern, which before they did not know themselves to be.

What if the father refuses his consent? In one such case the boy lost his chance for further education. In another case the boy, after working a year or two for his father, gave him notice that he would leave the home and shift for himself unless he was permitted to resume his schooling with a home project as a part of his schooling. Then the father surrendered. But in most cases the father's affection for the boy is stronger than ignorance and prejudice combined, and, after the advantages of the plan have been clearly and simply put before him, he consents that his boy go on with an education which the home and the school combine to give him.

Generally one year of this experiment is sufficient to win for its continuance the father's cordial approbation. The teacher's instruction to the boy is in turn imparted to or picked up by the father. He finds that " book learning " is not useless when it is understood by a practical farmer and applied in the practical treatment of the farm. Thus in one case a boy had as his home project six rows of potatoes in his father's potato field. The father sprayed the potatoes with arsenate of lead, which protected them from insects; but arsenate of lead does not protect from blight. The boy learned this fact at school, and, coming home, asked permission to spray the potatoes also with Bordeaux mixture. The father thought this a needless expense, and declined. Then the boy asked permission to make enough Bordeaux mixture to spray his own Home Project, and the father assented. In the fall the boy's potato vines were flourishing, the father's potato vines were dead. The next spring the father told the boy to prepare the necessary amount of Bordeaux mixture for the protection of the next year's crop and bought a barrel and pump sprayer. In another case the boy learned in school the relative cost of purchasing a fer-

tilizer compared with the cost of purchasing the materials and making a fertilizer, and learned that the farmer is at a disadvantage in buying his fertilizers at retail prices and selling his products at wholesale prices. He learned from the school that by combining with other farmers his father can buy fertilizers by the carload, and by selective packing of his fruit can secure a higher price for the better grades. The result was an enrichment of the entire community. I went into one orchard where the schoolboy had half a dozen apple trees as a part of his Home Project. Even with my unpracticed eyes I could see the advantage to the trees from his scientific pruning. In another part of this same farm the boy, as a part of his home project, was starting new trees from grafted cuttings from his father's orchard, thus saving the expense of a purchase from the nursery. Where sympathetic relations are established between the boy and his father, and also between the teacher and the boy, sympathetic relations between the school and the farm follow naturally and almost inevitably.

The public appreciation of the boy's success adds to the boy's new standing in the family. The boy is not without honor save in his own household, and when the honors which he has won outside are reported to the household his father and mother share in the pride of his achievement. The boy's examinations are conducted partly, at least, on the farm or in connection with his farm work. The boys are taught how to judge cattle and other farm products. These boy judges are themselves judged in turn by a committee of experts. On one farm which I visited the boy had won a prize for the wisdom of his judgment. The prize was a young Jersey bull — pure bred and registered — and we went out to the pasture to see it. The boy's pride in showing us his prize was delightful to witness. It needs no great imagination to enable one to realize what the possession of that bull meant, not only to him, but to his father and his mother. Another boy had earned as his prize a trip to Washington, D. C. Can any one doubt that this journey to the capital of his country, which the father and mother had never visited, gave him a new standing, not only in the home, but in the farms in the immediate vicinity?

Farming is a much more intricate operation than the average city-bred person imagines. We shall all know a little more about it after

the experience in farming which the country is getting this year. I heard on this trip of one enthusiastic lady who to prepare her potatoes for planting cut them in slices, as she would for frying. I wonder what harvest she will get? I heard of an enthusiastic gentleman who to prepare his field for potatoes plowed just deeply enough to turn the sod over and give it a fresh chance to grow. There are only eleven girls in Massachusetts who are taking the agricultural course, though there are hundreds who are taking the course in home-making. I visited one of these eleven girls on her farm. I had been told before that her health was so poor and her intellectual equipment so inadequate that the teacher and the doctor combined to advise that she be taken out of school. She was, however, allowed to enter the agricultural department. She came out to our automobile. A brighter and more intelligent face, healthier color, more vigorous action, no one would ask to see. She brought us her account-sheets, in which she had carefully kept all the expenses for food for her animals and seed for her ground, and in which she had credited herself with the market value of all her products. She knew exactly what the profit of her agricultural ventures had been. This girl, who the teacher and the doctor thought must leave the school, won last year the first prize in potato-growing in competition with not only the ten other girls but also the five hundred boys pursuing agricultural education. There is evidently no sex prejudice in this agricultural education. A second prize in judging live-stock at the Eastern States Exposition last October was won by a girl in competition with a hundred boys from the Northeastern States, including all of New England, New Jersey, and Pennsylvania. Her prize was a pure-bred Jersey bull calf of the finest lineage — a calf for which she has refused fancy prices. The total value of the prizes won in Massachusetts agricultural schools in 1916 was $1491.80.

It was a delight to see the pride which these young farmers took in their work, the smiling welcome which they gave to their teacher, the fellowship between the two — born of common interest in the soil and its products — their freedom from all self-consciousness in talking with us strangers, and the exactitude of their knowledge in reporting the results of their work. They knew just how many eggs they

had gathered from their hen yards, how much profit they had made from the pigs, how many quarts of milk they got from their cow. There was never any guesswork. Not less inspiring was it to see the estimate they put upon education. One boy went every day five miles to his school and five miles to his home in return. He had, it is true, a bicycle, but the road was so hilly that the bicycle carried him only one-half of the distance, while he, so to speak, carried the bicycle the other half. Another boy lived ten miles from his school, going back and forth once a week, yet contriving to keep up his home project successfully.

The interest of these pupils is not purely an industrial interest. The education is not merely an education in soils and crops. It includes not only a practical acquaintance with simple bookkeeping, but a practical habit of so keeping the books as to insure wise economies and wise expenditures. To be a really successful farmer one needs to know, not only something concerning soils and fertilizers and crops, but also something concerning markets. These school boys and girls are required as part of their education to do very careful bookkeeping. There lie before me copies of the account-sheets kept by some of these pupils. One of them, for example, "a pupil's approved individual cow account," gives in tabulated form the pounds of milk furnished by the cow each month, a statement of the cost of feed so itemized as to show the cost of each article, the proceeds received from the sale of the milk, and the profit or loss of the cow for each month. Another table gives a summary of all the other earnings of the boy, including playing the violin for an evening entertainment, the boy being a capable musician. A third table is a condensed financial statement for a year on a dairy project covering five cows, and was accompanied by an individual record of these five cows. This particular table I transfer to these pages (substituting only the boy's initials for his name), at the top of the next column; it shows better than words could do how the boys learn to render condensed and simplified accounts, how to handle their figures, how to think straight, and how to boil the results down so that at a glance they or their parents or instructors may perceive the result in dollars and cents of the year's industry.

Nor is this all. These agricultural departments in the high schools include cultural as well as vocational training. Roughly speaking, about one-half the pupil's time is devoted to his farm work and the scientific education required to make that farm work of the best quality. The other half of the pupil's time is devoted to study in the school of such topics as English; social science, including community civics and economics; natural science, including biology, physics, and chemistry; drawing; shop work; some of the more elementary commercial themes; physical training; and the opportunity for music and recreation.

TABLE NO. 13. — COPY OF A PUPIL'S APPROVED "FINANCIAL STATEMENT" ON A DAIRY PROJECT

H. C. N.

| DATE | TRANSACTIONS | HOURS | | DAIRY | |
|---|---|---|---|---|---|
| | 1914 Financial Statement | Man | Horse | Receipts | Expenses |
| | My labor . . . . . at $ .25 | | | | $ 161 60 |
| | Other man labor . . . at .20 | | | | 90 58 |
| | Miscellaneous expenses . . . . | | | | 65 64 |
| | Net profit . . . . . | | | | 144 80 |
| | Manure, 55 tons . . . at 1.50 | | | $ 82 50 | |
| | 5 calves . . . . . at 4.00 | | | 20 00 | |
| | 31,342 lb. milk . . . . .022 | | | 689 52 | |
| | Stock bought . . . . . | | | | 25 00 |
| | Inventory, 1913 . . . . . | | | | 243 00 |
| | " 1914 . . . . . | | | 336 75 | |
| | Feed . . . . . | | | | 398 24 |
| | Totals . . . . . | | | 1,128 77 | 1,128 77 |

Some tragedies this farm work has averted. In one farm which we visited the father had died, leaving a boy of seventeen the sole support of his widowed mother. Their means were limited. He had one cow and no horses. To get his field plowed he swapped work with his neighbor. But he found time to attend the school, and it was clear that the friendly fellowship of his teacher saved him from the loneliness of what would otherwise have been a most pathetic life and enabled him to feel that he was really an appreciated member of a great industrial community. Another boy with curvature of the spine

had cultivated a little plot of ground adjoining his village home and sold the products from a pushcart until he had made enough to buy, I think it was, two acres of land, where he was cheerfully working as we passed by, and from which he came to us with beaming face to greet his friend the teacher. In still another case we found two pioneer boys who were redeeming a plot of ground from a forest. They had lived one year in a tent while they were building the not uncomfortable-looking shack which is now their home. How the half-dozen forest trees had been felled I do not know, but they had rooted out the stumps and dug up the plot of ground which constituted the beginning of their farm. My companion expressed her admiration for their grit by remarking to one of the boys: "I should not like to do that hard plowing." His reply was: "I like it, and that is the difference between you and me."

This development of pride in hard work struck me as one of the most notable benefits of this farm education. One of the pupils whom I visited had taken, with his brother, a large home project, and he told us with evident pleasure, not as a matter of boasting, but in response to our inquiry as to his hours of labor, that the day before he had risen at half-past five in the morning to do his chores, including the milking of twelve cows before breakfast, and at a quarter past nine at night had been putting some seed into the ground by lantern light because he wanted to get the job done that day.

The home project, planned at the school, studied at both school and home, executed by the pupil, and sympathetically supervised by the expert agricultural instructor traveling from farm to farm, is the dominant feature of the Massachusetts system of vocational agricultural education. There are no school dormitories in this system. The home project is no less characteristic of the four separate and county agricultural schools than it is of the one-teacher or two-teacher departments in high schools. Everywhere it is a system of "earning and learning"; and the earnings are of considerable economic importance, amounting for five hundred pupils in 1916 to $75,766.53.

I am not so much interested in what these boys and girls are doing for the soil as I am with what the soil is doing for these boys and girls. This form of agricultural education seems to me to throw no little

light on some of the perplexing problems of our American life. It is a great unifier. It brings the school and the home together; the teacher and the parents together; education and life together; and, what is perhaps best of all, fulfills the promise of the Hebrew prophet and turns the heart of the fathers to the children and the heart of the children to the fathers.

# INDEX


A

Abbott, Dr. Lyman, 16, 431, 451
Accounts and accounting, 55–57, 77–78, 231, 234, 241, 252, 256, 258, 295, 340, 410, 412, 414–415, 420 ff., 439, 458–461
Adams Act, 38
Admission of pupils, 280 ff.
Advisory Committee, 183, 189
Agreement, Application and, 282–285, 353, 390, 400–409, 454–457
Agricultural departments in high schools, 24, 25, 26, 29, 178–301, 315
Agricultural Education, Vocational, Needs of, 315–322
Agricultural Schools, 9, 21, 22, 178–301, 315–322
"Agricultural Survey" instruction, 72–76, 158
Agricultural textbooks, general, 164, 172, 173
Allen, C. R., 15
American Association for the Advancement of Agricultural Teaching, 338
Ames, F. L. *See* Langwater Farms
Amsden, Maude, 431
Animal Diseases, Books on, 165
  Feeds and Feeding, Books on, 165
  Life, Propagation and Tests, Books on, 165
  Husbandry, Books on, 162
Arab Horses, 364–371
Ashfield Agricultural Department, 58, 110, 111, 115, 135, 156, 189, 208, 304, 309, 346–351, 429, 453

B

Bacteriology, Agricultural, Books on, 166, 168
Bagley, W. C., 8
Bailey, L. H., 105, 109, 154, 155, 159, 163, 164, 166, 169, 171, 174
Balch, Russell, 217
Bartlett, C. S., 441–445
Baxter, Sylvester, 310–313
Bee Projects, 79, 160, 231
Benson and Betts, 158
*Better Fruit*, 138
Bibliography, cntry numbers, etc., 100–101, 135 ff.
Birds and Agriculture, Books on, 166
Bitterness, Early, between Advocates of Cultural and Vocational Education, 17, 19
Blakeslee and Jarvis, 173
Bloom and Johanson, 212–215, 434–435
Borden, Spencer, 364–371
Boston, Survey regarding Agricultural Instruction for Families in, 325 ff.
Boston, L. B., 101, 102, 420
Boston University, Bureau of Educational Service, 11
Botany and Plant Physiology, Books on, 166
Bradlee, T., 101, 102
Branches of County Agricultural Schools in Massachusetts, 191, 201
*Breeder's Gazette*, 138
Bricker, G. A., 172, 174
Brimfield Agricultural Department, 87, 113, 205, 209–211, 300–303, 306, 307, 313, 320, 428, 429
Bristol County Agricultural School, 92, 93–95, 97, 150, 151, 210, 241, 243, 251, 268, 281, 282, 287–289, 298, 338, 339, 363, 378, 379, 381, 387, 422, 429
Brooks, W. P., 164
Brown, E. E., 16
Bureau of Education, U. S., 11, 13, 14, 23, 140, 357
Burke, E. J., 101, 358
Burkett, C. W., 165, 171–173
Butterfield, K. L., 174. *See also* Massachusetts Agricultural College

C

Cance, Alexander, 350, 351
Career Motive, 264, 265, 281
Carver, T. N., 168
Certification Records, 425
Chemistry and Agriculture, Books on, 167
Chicago, Evening Agricultural Instruction in, 323

Chipchase, George, 363
Citizenship Education, 258 ff., 446–449
City Tenement Families, Agricultural Instruction for, 322–337
Clinton Agricultural Department, 429
Clydesdales at Langwater Farms, 279, 372, 373
Coggeshall, D. E., 434
College, Short Courses in Agriculture as Winter Stop-gaps, 343
Collingwood, H. W., 160
Commissioner of Agriculture in Massachusetts, 308,, 314
Commissions on Industrial Education in Massachusetts, 8–10
Common Sense, Organization of, 93–94
Community Organization, 352, 354, 356
Concord Agricultural Department, 60, 62, 63, 66–69, 77, 81, 100, 112, 152, 153, 178, 183, 186, 187, 195, 214, 219, 232, 233, 271, 284, 294, 312, 388, 389, 403–405, 408, 429
Concrete mixing and use, 33
"Conference on Wheels," 360, 364–367, 374
Connecticut River Stock Farm, 332
Conservation, A Problem of, 10–14
Construction and Repairs, Books on, 167
Coöperation, 182, 183, 357–381
Coryell, J., 101, 102
Cost Accounting. *See* Accounts
Country Life, Books on Betterment of, 174–175
County Organizations, Model, 378–381, 384
County Planning Conferences, 344–347
County Agricultural Schools Compared with High School Agricultural Departments, 178 ff. *See* Table of Contents *for outline*.
Courses in Schools and Departments Compared, 216 ff.
Cow Account for a year, 414–415
Cranberry Growing, 396
Crocheron, B. H., 34
Crosby, D. J., 26, 34
Cultural Education, 7, 8, 9, 10, 446–449

D

Dairy Products and Manufactures, Books on, 168
Dairy Projects, 83, 238, 242
Davenport, Eugene, 164, 174
Davis, I. G., 87, 205, 411
Davis, Philip, 325
Day, G. E., 161
Day, Length of Pupil's, 292
Defeat, Traditions of, 97
"Deferred Values," 89, 90
Departments, Agricultural, 24–29, 178 ff., 315
De Quoy, 436–437
Dickinson, W. H., 333
Doolittle, A. W., 102, 284, 312, 388, 389, 405, 421, 422
Dormitories, Avoid, 375–376
Douglas Commission on Industrial Education, 8–9
Duggar, B. M., 166, 170
Duggar, J. F., 172
Dunham, Austin, 323–324

E

Earning and Learning, 56, 87, 429
Eastern States Exposition, 433, 434, 458
Eastwood, 437–439
Eaton, T. H., 175
Economics, Rural, Books on, 168
Education, 1. *See* analysis of Chapter I, in Contents
Education, Money Values of, 11, 13, 14
Education, Rural, Books on Betterment of, 174–175
"Educational Manager," 197
Educators, Coöperation with, 183
Edwards, F. L., 431
Ellis, A. C., "Money Value of Education," 11, 13, 14
Ellsworth, J. L., 308, 313
Emerson, Ralph Waldo, 7
Employment of Pupils, 383 ff.
Enrollment Cards, 390, 391, 400, 401
Essex County Agricultural School, 46–52, 54, 55, 78, 142, 145, 147, 188, 191, 196, 203, 212, 213, 215, 217, 218, 221–226, 228–231, 236, 253, 254, 258, 269, 270, 296, 338, 349, 363, 365, 381, 394, 429, 432 ff.
Evening Classes, 256

F

Falmouth, Mass., 429
Families, Tenement, Agricultural Instruction for, 332–337, 384
Farley, G. L., 336
Farm Bureau Departments and Coöperation, 191, 362–364, 384
Farm Income and Education in New York, 14
Farm Management, Books on, 168
Farm Management Projects, 83, 238, 342

Farm Practice Sheets, 257, 295, 425
Farm Shop Work, 227, 238, 239, 243, 343
Farmers, Coöperation with, 185, 372–378
Farming in Massachusetts, 303–315
Fay, J. H., 102, 108
Federal Board for Vocational Education, 140, 341, 357–358
Feeds and Feeding, Books on, 165
Fertilizers, Books on, 170
Field Crop Projects, 238, 243
Fish, F. P., 13–14
Forgetting, Education in, 90
Franklin County Farm Bureau, 351
Fruit Growing, 78, 83, 159, 163, 169, 221–230, 238, 242, 408
Fumigation, Books on, 172

G

Garden City, Aiding Movement toward, 322–337
Gardening and Games, 336–337
*Garden Magazine*, 138
Gaskill, R. H., 394, 397
General Education Subjects, 258 ff.
"Gentlemen of the Old School," 446–449
Geology, Books on, 170
Georgia Agricultural Schools, 23
Gilbert, G. H., 339, 387, 422
*Gleanings in Bee Culture*, 138
Graduates, Keeping in Touch with, 440 ff.
Grange, The, 182
Greene, M. Louise, 71
Griggs, Edward Howard, 14

H

Hackneys, 362, 363
Hadley Agricultural Department, 85, 86, 88, 89, 139, 197–202, 210, 235, 249, 255, 256, 262, 263, 297, 305, 358, 429
Half-day Blocks of Time for Project Study and Project Work, 71–76, 341 ff.
Hall-Quest, A. L., 76, 175, 342, 366
Hall, Wells A., 422
Hampton Institute, 451
Hanus, Paul H., 9
Harper, M. W., 158, 162
Harris, Abram, 4
Harvard College, 1, 5, 7
Harwich Agricultural Department, 192, 429
Hatch and Hazlewood, 172
Hatch, Mayne and, 158
Hawkins, L. S., Chief. *See* Federal Board for Vocational Education
Henry, W. A., 165
High School Agricultural Departments compared with County Agricultural Schools, 178 ff.
High School, the People's College, 7
*Hoard's Dairyman*, 138
Holyoke Agricultural Department, Evening, 429
Home-Making Departments of Agricultural Schools, 35–37, 39–45, 452
Home Project
  Origination of, 35–40
  Defined and described, 40–44
  Cost accounting essential to, 55
  No-dormitory plan, 36, 375–376
  Parents like home projects, 53, 454–457, 462
  Pupils like home projects, 54, 98, 454–462
  Substitutes for, 22, 233, 239, 245, 246, 255, 256
  Universally applicable, 58
Homestead Commission, Massachusetts, 330, 337
Hood Farm, Lowell, Mass., 442, 444
Horses, Management of, 238, 245
Hummel, W. G., 175
Hunt, T. F., 164, 168, 171, 175
Huxley, 93

I

Improvement Projects, 40, 41, 42, 85
Insects, Books on, 169
"Interlachen." *See* Borden, Spencer
International Film Service Inc., 270
Itinerant Agricultural Instruction for Families, 322–337

J

Jarvis, Blakeslee and, 173
Johanson and Bloom, 212–215, 434–435
Jordan, W. H., 165

K

King, Mrs. W. A., 360
Kitchen Gardening, 76, 119–126, 139, 159, 194, 222, 261, 403

L

Langwater Farms, 267, 278, 279, 372–374
Lapp and Mote, 12, 175, 369
Leadership *versus* Service, 384 ff.

Lee, C. E., 403, 408, 427
Leominster Agricultural Department, 429
Lettuce Growing, 96, 126–134
Lewis, H. R., 160
Library Bureau, 417
Lincoln, Abraham, 4
Lipman, J. G., 166
Lippincott, W. A., 160
Long Distance Educator, 369–370
Long Term Planning, 352, 354, 356
Loti, Pierre, 14
Lowell, James Russell, 2

M

Mann, A. R., 73, 158
Market Gardening Books, 163
Market Gardening Projects, 61, 83, 194, 238, 243, 261
*Market Growers' Journal*, 138
Marlborough Agricultural Department, 80, 107–109, 207, 208, 310, 429
Massachusetts. *See* Needs, *and* Surveys
Massachusetts Agricultural College, 304, 346, 350, 351, 352, 354, 356, 359–361, 364, 397, 442, 451
Massachusetts Agricultural (College) Experiment Station, 145
Massachusetts Agricultural College Extension Service, 147, 397, 446
Massachusetts Board of Agriculture, 151, 308, 314, 361–362
Massachusetts Board of Education, 13, 19, 38, 323 ff.
Massachusetts Farming, 303–315
Massachusetts High School Masters Club, 342
Massachusetts Homestead Commission, 330, 337
Massachusetts State Forester, 151, 362
Mayne and Hatch, 158
Mayo, N. S., 165
Meier, W. H. D., 159
Mental Discipline, 7
Merriam, B. J., 386–388
Metcalf, E. E., 396 ff.
Metcalf, Miss Julia, 385
Methods of Instruction, 276 ff.
Middle Distance Educator, 370–371, 384
Minnesota Northwest School of Agriculture and Branch Experiment Station, Crookston, 34, 338
Minnesota School of Agriculture, St. Anthony Park, 21, 338
Moore, Judge W. H., 362, 363
Morrill Act, 4
Morrill, Justin S., 4
Moses, H. A., 442
Music, 262, 264, 265, 448
Myrick, Herbert, 162

N

National Dairy Show, 434
National Education Association, 19
Needs for, or in, Vocational Agricultural Education, 30, 31, 315–322
*New England Homestead*, 138
New Salem Agricultural Department, 429
Newton Agricultural Department, 388, 429
New York, Education and farm income, 14
Nolan, A. W., 172, 175
Non-resident Pupils, 282
Norcross, H. C., *Frontispiece* and 410, 412, 414–415, 418, 420
Norfolk County Agricultural School, 193, 214, 318, 319, 363, 378–381, 429
North Adams Agricultural Department, 386, 429
North Attleborough Agricultural Department, 429
North Easton Agricultural Department, 59, 79, 90, 91, 102, 103, 157, 185, 193, 267, 272, 273, 278, 279, 311, 374, 381, 429
Northrup, Cyrus, 22
Northwest School of Agriculture, Crookston, Minn., 34, 338
Norwood Agricultural Department, 429

O

"Open Doors of Opportunity," 26
Orange Agricultural Department, 429
Ornamental Planting, 61, 83–85, 161, 223
Outline Making, 76–85, 99 ff., 355, 410 ff.
*Outlook, The*, 310, 451

P

Pageants, 382–383, 448
Palmer, George Herbert, 5
Panama Pacific Exposition, Massachusetts Exhibit at, 15, 17, 18, 20–22, 440. *See author's* Preface
*Park and Cemetery*, 138
Part-time Pupils, 254, 300, 302, 447
Patrons of Husbandry, 182
Pepper, C. L., Statistical Charts Prepared by, 17–22, 440

Petersham Agricultural Department, 56, 57, 99, 114, 117, 140, 141, 154, 237, 240, 246, 247, 285, 286, 308, 429, 431
Pet-stock, Transition from, 81
Physical Geography, Books on, 171
Physical Training, 260 ff.
Physics of Agriculture, Books on, 170
Plant Diseases, Books on, 170
Plant Foods and Feeding, Books on, 170
Plant Life, Propagation and Tests, Books on, 171
Pottinger, D. T., 449
Poultry Projects, 61, 80, 101, 139, 160, 194, 231, 261, 404–405
Powell, E. C., 160
Powers, J. G., 101, 102
Pratt Experiment Farms, 358.
Prizes, 154, 249, 270, 296, 305, 430–431, 436, 437, 439, 457, 458
Productive Projects, 41, 42, 43, 86–88, 406
Productive Work, Vital Test, 32
"Professional Improvement," 197, 269, 342–351
Profita, Francesco, 325
Project Agreements, 353, 390, 400, 409, 454–457
Project, Educational Analysis of a, 44–50
Project Fields or Classes, 44
Projects and Other Farm Work, 50, 454 ff.
Projects, Kinds of, 64–66
Projects, School Farming as, 338 ff.
Projects, Size of, 406 ff.
Project Study Adapted to Individuals, 63–64, 71–75, 454–457
Project Study, Grouping of Pupils for, 60–63
Project Study, Natural *versus* Artificial Units, 94
Project Study, Organization of Common Sense, 93–94
Project Study, Range and Progress of, 59
Project Study *versus* Subject Study, 88–98
Projects, Substitutes for, 22, 217, 233, 239, 245, 246, 250, 255, 256, 264, 265, 303, 390, 408–410, 437
Project, Surveys of Facilities for, 353
Project Vicissitudes, 99
Project Work, School Credit for, 409
Prosser, C. A., 10, 39–40
Publishers, List of, 176–177

Q

Qualifications of Agricultural Instructors, 266 ff., 454

R

Reading Agricultural Department, 212, 351, 429
Records, 231, 234, 241, 252, 256, 258, 294 ff., 342–351, 353, 355, 418 ff.
Recreation, 264, 265, 266, 285, 385, 448
Redfield, W. C., 12
Reference Books, List of, 158 ff.
"Related Study," 227, 234, 241, 252
Remembering, Education in, 96
Reports, 300, 340, 427 ff. *See also* Accounts
Rice, J. E., 143
Robertson, J. W., 175
Robinson, J. H., 160
Robison, C. H., 175
Roosevelt, Theodore, 384
Rose, M. S., 102
*Rural New Yorker*, 138
Russell, H. L., 166, 168

S

Salaries of Agricultural Instructors, 276
Sampson, H. O., 158
Sanderson, E. D., 169
Saugus Agricultural Department, 391, 429
*School and Home Education*, 8
School Farms, Limitations of, 32 ff., 178 ff., 375 ff.
Schools of Privilege, 9
Schools of Protest, 9
School Year, 287 ff.
Sears, F. C., 163
Seasonal Planning of Instruction, 355–357, 403, 404–405, 408
Service, Fight for, 384 ff.
Service System, A Model, 378–381
Sevey, G. C., 159
Sheep Projects, 61, 82, 139, 140, 161, 194, 231, 261
Shetland Pony Breeding, 360
Short Distance Educator, 371–372, 384
Shrubs, List of, 83 ff.
Small, R. O., 40, 178
Smith, F. A., 222–230
"Smith-Hughes Act," 19, 322, 342, 344
Smith, Payson, 40
Smith, W. C., 10
Smith Agricultural School, 24–31, 37, 82, 116, 136, 137, 148, 149, 182, 208, 234, 244, 245, 248, 260, 263, 276, 277, 283, 290, 291, 295, 316, 322–330, 334, 336–338, 340–347, 382–385, 429, 450
Snedden, David, 39–40, 175

Spectator *versus* Participant, 33–34
Spencer, Herbert, 3
Soils and Soil Fertility, Books on, 171
Soule and Turpin, 172
Spraying, Books on, 172
Sterling, Henry, 330, 337
Stimson, R. W., 451
Stimson, S. N., 395, 397
Sub-projects, 232, 238, 239, 243, 245
Substitutes for Home Projects, 22, 217, 233, 239, 245, 246, 250, 255, 256, 264, 265, 303, 390, 408–410, 437
Success, Traditions of, 97
Supervised Study, 342
Supervision, Spirit and Methods of, 297–300, 353, 426, 455, 457, 458, 460, 461
Surveys, 302–315, 323–337, 392–395, 399
Sussmann, Rudolf, 346–351
Swett, R. W., 388
Swine Projects, 61, 82, 139, 141, 142, 145, 147, 161, 194, 231, 243, 261

T

Teachers, Qualifications of Agricultural, 266 ff., 454
Teacher-Training, Agricultural, Itinerant, Project Plan, 344–345
Team-Work, 357–381
Tenement Families, Agricultural Instruction for, 322–337
Terms, Length of, 287 ff.
Textbooks, Lists of, 158 ff.
Three R's of the Project Method, The, 66, 70
Titlow, C. R., 348
Tompkins, Col. Frank, 368–371
Trees not for Fruit, Books on, 173
"Trial" Projects, 40, 41, 42, 85
Turner Hill Farm, 221–230
*Two States*, 10

U

Underwood and Underwood, N. Y., 368, 370
United Cape Cod Cranberry Co., 396
United States Department of Agriculture, 26, 34, 140–142, 143–144, 357–359, 369, 421

V

Vacations, 290
Vegetable Growing Projects, 61, 76 ff., 99 ff., 139, 159, 161, 194, 222 ff., 232–233, 238 ff., 243 ff., 250, 261
Vivian, Alfred, 171
Vocational Agricultural Education, 19 ff. *See* Table of Contents *for topics*
Vocational Education, 6–10. *See* Table of Contents *for topics*

W

Wakefield Agricultural Department, 429
*Wareham Courier*, 138
Warren, G. F., 14, 74, 155, 158, 168
Waters, H. J., 158, 184
Watts, R. L., 105, 159, 163
Waugh, F. A., 159, 161, 163, 169
Weed, Miss S. M., 83–85
Weed, C. M., 169, 172, 173
Weeds, Books on, 174
West Virginia University, 348, 385
Weymouth Branch of Norfolk County Agricultural School, 379, 429
Wheeler, H. J., 170
Wheeler, Wilfred, 314
Williams, R. W., 439–440
Wing, H. H., 168
Wing, J. E., 161, 168
Wood, Miss Ruth, 270, 432–434
Worcester Agricultural Department, 427, 429
Wright, Carroll D., 8

Y

"Young America's Opportunity," 11

Z

Zoölogy, Books on, 174

Printed in the United States of America.

## BOOKS ON AGRICULTURE

*ON TILLAGE:*

| | |
|---|---|
| Bailey's Principles of Agriculture | $1.40 |
| King's The Soil | 1.75 |
| King's Irrigation and Drainage | 1.75 |
| Lyon, Fippin and Buckman's Soils: Their Properties and Management | 1.90 |
| Roberts's The Fertility of the Land | 1.50 |
| Snyder's Soils and Fertilizers | 1.25 |
| Voorhees's Fertilizers | 1.60 |
| Wheeler's Manures and Fertilizers | 1.75 |
| Widtsoe's Dry Farming | 2.00 |

*ON GARDEN-MAKING:*

| | |
|---|---|
| Bailey's Garden-Making | 1.75 |
| Bailey's Vegetable Gardening | 1.75 |
| French's How to Grow Vegetables | 1.75 |

*ON FRUIT GROWING, ETC.:*

| | |
|---|---|
| Bailey's Fruit Growing | 2.00 |
| Bailey's Pruning Manual | 2.50 |
| Card's Bush Fruits | 1.75 |
| Lodeman's Spraying of Plants | 1.75 |

*ON THE CARE OF LIVE STOCK:*

| | |
|---|---|
| Jordan's The Feeding of Animals | 1.75 |
| Lyon's How to Keep Bees for Profit | 1.50 |
| Mayo's Diseases of Animals | 1.75 |
| Phillips's Beekeeping | 2.00 |
| Valentine's How to Keep Hens for Profit | 1.50 |
| Watson's Farm Poultry | 1.60 |

*ON DAIRY WORK:*

| | |
|---|---|
| Eckles's Dairy Cattle and Milk Production | 1.60 |
| Snyder's Dairy Chemistry | 1.50 |
| Wing's Milk and Its Products | 1.60 |

*ON PLANT DISEASES:*

| | |
|---|---|
| O'Kane's Injurious Insects | 2.00 |
| Slingerland and Crosby's Fruit Insects | 2.50 |
| Stevens and Hall's Diseases of Economic Plants | 2.00 |

*ON ECONOMICS AND ORGANIZATION:*

| | |
|---|---|
| Fairchild's Rural Wealth and Welfare | 1.50 |
| Green's Law for the American Farmer | 1.75 |
| Hunt's How to Choose a Farm | 1.50 |
| Ogden's Rural Hygiene | 1.60 |
| Roberts's The Farmer's Business Handbook | 1.50 |
| Weld's Marketing of Farm Products | 1.60 |


THE MACMILLAN COMPANY

**64-66 Fifth Avenue, New York**

**BOSTON CHICAGO SAN FRANCISCO ATLANTA DALLAS**

## Eckles and Warren's Dairy Farming

*309 pages, $1.20*

The aim of this book is to discuss the points that are of most importance to the farmer; that is, to answer the farmer's questions, and to put these answers in the form of underlying principles rather than as rules. It aims to give the basic principles of the subject without being superficial. It aims to teach underlying principles so that a farmer will know how to change his practice to meet everchanging conditions.

The chapters of the book indicate its scope: Importance of the Dairy Industry; Breeds of Cattle; Selection and Improvement of Dairy Cattle; Management of Dairy Cattle; Feeding Dairy Cattle; The Dairy Barn; Common Ailments of Cattle; Milk and Its Products; Conditions Affecting the Development of Dairying; Systems of Farming on Dairy Farms; Methods of Renting Dairy Farms; Cost of Production and Methods of Marketing; Other Important Factors for Success.

## Harper's Animal Husbandry

*409 pages, $1.40*

In the five parts into which the book is divided the author treats of horses, cattle, sheep, swine, and poultry, and each is discussed with reference to breeds, judging the animal, feeding, and care and management. There is also a chapter on the general principles of feeding. Practical questions and numerous laboratory exercises supplement the text and compel the student to think through each subject as he proceeds. The book is extensively illustrated. Designed for use as a textbook, it is also well suited for use as a reference book in schools in which time limitations make it impossible to use it as a text.

THE MACMILLAN COMPANY

64-66 Fifth Avenue, New York

BOSTON CHICAGO SAN FRANCISCO ATLANTA DALLAS

HIGH SCHOOL TEXTS ON CROPS AND TILLAGE

## Livingston's Field Crop Production *424 pages, $1.40*

The book is simple and non-technical in style and intensely practical, the topics treated being those of immediate interest and profit to students who expect to become actual farmers. It points out the "better way" of raising farm crops, of selecting the field, of preparing the soil, of sowing the seed, of cultivating the plant, of harvesting the crop.

After an introductory view of the whole field of plant life and crop rotation, there are twenty chapters on different crops, for example, corn, wheat, oats, barley, rye, rice, buckwheat, perennial grasses, annual grasses, clovers, alfalfa, root crops, fibre crops, etc. There is a chapter also on marketing grain.

## Harris and Stewart's Principles of Agronomy *430 pages, $1.40*

Deals with the practice that underlies success in crop production and will be welcomed by those schools that emphasize, in the agriculture course, the field crop studies. The student is introduced in this book to the four elements that will affect his success in raising crops for market. First, the nature of the plant and its activities; then, the composition of soils; next, the characteristics of the principal field crops and details regarding their cultivation and care; finally, the principles of farm management. When one has surveyed the subject from these four points of view he has a clear idea of what is involved in the practical problem of crop production. He sees that results are determined by the character of the plant, by the soil, and by the management as well as by the crops themselves.

## Lyon's Soils and Fertilizers *255 pages, $1.20*

The subject matter is presented in simple non-technical style and presents first, ten chapters on soil, covering such topics as Soil Formations, Texture and Structure of Soil, Organic Matter, Soil Water, Plant Food Materials, Acid and Alkali Soils. There are nine chapters on fertilizers. First the four or five general types are discussed and then such applied practice as The Purchase and Mixing, and The Use of Fertilizers, Farm Manures and Green Manures and Crop Rotation.

THE MACMILLAN COMPANY

**64-66 Fifth Avenue, New York**

**BOSTON CHICAGO SAN FRANCISCO ATLANTA DALLAS**

# Chemistry and Its Relations to Daily Life

By LOUIS KAHLENBERG, Professor of Chemistry, and EDWIN B. HART, Professor of Agricultural Chemistry, University of Wisconsin.

*Cloth, 12mo, Ill., 393 pages, $1.25*

This book outlines a year's work for students of agriculture and home economics in secondary schools. The subject matter is thoroughly practical in character and it is presented in a simple, interesting manner. Chemical formulas are introduced, but merely as an aid in expressing facts in simple, compact and convenient form. Questions follow each chapter, and in a chapter at the close of the book are definite suggestions for about a hundred and fifty practical laboratory experiments. These include besides the usual chemical experiments of the elementary course, several problems not usually attempted, such as the bleaching action of various acids, the preparation of soap, the absorbing power of carbon, antidotes for many poisons, etc.

The practical character of the book and its adaptability to meet the needs of the home and the farm are indicated by the chapter headings, among which are: The Composition and Use of Water; Carbon and Its Compounds; The Metals of the Alkalies and the Alkaline Earths; Paints, Oils and Varnishes; Leather, Silk, Wool, Cotton and Rubber; The Soil; Commercial Fertilizers; Farm Manures; The Animal and Its Feed; Human and Animal Foods; Milk and Its Products; Poisons for Farm and Orchard Pests.

---

THE MACMILLAN COMPANY

NEW YORK SAN FRANCISCO ATLANTA
CHICAGO BOSTON DALLAS

YC 49055

LC
1050

672579

LB1681
S7
Vocat educ

UNIVERSITY OF CALIFORNIA LIBRARY